UNDERSTANDING RECREATIONISTS' ATTITUDES TOWARD AND PREFERENCES FOR NATURAL RESOURCES CONSERVATION

A Dissertation

by

CHI OK OH

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2005

Major Subject: Recreation, Park and Tourism Sciences

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Approved by:

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ABSTRACT

Understanding Recreationists' Attitudes Toward and Preferences

for Natural Resources Conservation. (August 2005)

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Co-Chairs of Advisory Committee: Dr. Robert B. Ditton
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With ever-increasing demands on scarce natural resources, understanding public attitudes toward natural resources is crucial to accomplishing various management goals for resource conservation and the provision of resource services. Despite numerous studies of public attitudes toward resource conservation since Dunlap and Heffernan (1975), there is a limited understanding of the driving forces underlying recreationists' activities that contribute to their conservation attitudes and behaviors. Thus, this dissertation investigated the connected causal effects of how recreational anglers develop their conservation attitudes and preferences toward natural resources in light of within- and between-group diversity. Three independent studies, focusing on both recreation specialization and recreationists' conservation attitudes, were conducted with different research themes. Two different methods, namely, a stated preference discrete choice method and structural equation modeling, were used. The first study examined anglers' holistic preferences for trade-offs of various management rules and regulations using specialization segmentation. Study results supported that high specialization

anglers reported a greater appreciation of and support for resource management practices such as harvest regulations that seek to reduce adverse user impacts than their less specialized counterparts. The second study explored the fostering process of conservation attitudes and behaviors with recreation specialization and other motivational and attitudinal variables. Given that empirical analyses supported the theoretical propositions in the constructed model, recreation specialization and other accrued motivational and attitudinal concepts provided insight to understanding the formation pattern of conservation attitudes and behaviors. The third study examined how the fostering process of attitudes toward resource conservation differed by race and ethnicity. Results indicated that anglers, regardless of their racial and ethnic origins, showed similar patterns of fostering attitudes toward and preferences for resource conservation. As they participated in fishing activity on a regular basis, heterogeneous development in conservation attitudes and preferences were likely to be minimal and be better explained by the framework of recreation specialization. Finally, a summary and synthesis of the findings, agenda for future research, and the management implications were discussed.

DEDICATION

To My Parents

Soon Ja Park

&

Hong Mook Oh

To My Wife

Heekyoung Kim

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CHAPTER I

INTRODUCTION AND LITERATURE ANALYSIS

As recreational demands on natural resources increase, making better decisions about managing resources becomes more difficult. In particular, recreational activities such as fishing and hunting have received more research and management attention because of their consumptive use of natural resources and the public's increasing concern about resource loss and degradation. With ever-increasing demands on scarce natural resources, resource managers need to better understand recreationists' attitudes, motivations, ethics and expectations for resource conservation so as to attain various management goals such as reducing conflict among diverse recreationist groups and educating recreationists about management practices (Decker, Brown, & Knuth, 1996; Pierce, Manfredo, & Vaske, 2001).

As Decker et al. (1996) further indicated, a variety of environmental interests such as preservation of endangered species, maintenance of biodiversity, and designation of protected areas have been proposed by a diverse number of stakeholders. This has led to concerted efforts that promote conservation and sustainable use of limited resources. According to Manfredo, Vaske and Decker (1995), managers who seek the challenge of coexistence must mitigate and balance the impacts of the conflicting needs for resource conservation and the provision of natural resource services. In particular, understanding public attitudes toward natural resources is crucial in that (1) the conservation and

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This dissertation follows the style of *Leisure Sciences.*

protection of the natural environment is necessary for human physical and spiritual welling-being as well as for intrinsic biological and ecological values of the resource itself, (2) managing natural resources is more about managing people than resources because humans impact resources, and (3) it has been mandated that public opinion be taken into account in agency decision-making processes (Ditton, 1996; Manfredo et al., 1995; Tarrant, Bright, & Cordell, 1997).

Although information on public attitudes toward resource conservation is available and useful, there is limited understanding of the driving forces underlying recreationists' activities (i.e., recreational fishing in this dissertation) that contribute to building their conservation attitudes and behaviors. Previous studies (e.g., Dunlap & Heffernan, 1975, Pinhey & Grimes, 1979, Van Liere & Noe, 1981) have focused on examining the positive relationship between involvement in outdoor recreation activities and increased environmental concern. However, these efforts have been limited for understanding the systematic or interconnected process of fostering conservation attitudes and behaviors in two ways. First, the conceptual framework of aggregate recreational activities classified as appreciative and consumptive (e.g., Dunlap & Heffernan, 1975) may not be appropriate for understanding recreationists' heterogeneous characteristics of conservation attitudes and behaviors within an activity (Tarrant & Green, 1999; Theodori, Luloff, & Willits, 1998). Second, most previous studies have investigated group differences or identified a single effect for individual factors by using a uni-dimensional approach rather than exploring causal relationships with multiple factors. The comprehensive information can help provide managers with a greater

understanding for evaluating how and in what manner decisions and actions impact recreationists (Ewert, 1996).

Accordingly, this dissertation focused on exploring the relationships of recreationists' conservation attitudes toward and preferences for natural resources using various multi-variate approaches (i.e., a stated preference discrete choice method and a structural equation model) within a single activity, namely recreational fishing. Further, this dissertation sought to capture within- and between-group diversity in recreational fishing to facilitate understanding of sub-group differences and more equitable service delivery, which are often both disregarded in a contemporary management decision-making.

To achieve rational choices among alternative uses of natural environments (Goulder & Kennedy, 1997), managers are required to satisfy diverse recreationists by attaining seemingly incompatible management objectives concurrently (i.e., maintenance of a quality fishery resource and the provision of the high quality fishing experiences). (Holland, Ditton, & Graefe, 1998; Loomis & Holland, 1996; Quinn, 1996). Furthermore, the greater dependence of agency budgets on user generated revenue sources (e.g., fishing license fees and excise taxes imposed on fishing equipment) is based on the principle of user-pay/ user-benefit. And, this further complicates the manager's task, namely, to accomplish successful fishery management through the maximization of public support from diverse groups (Bohnsack, 2002; Bohnsack & Sousa, 2000; Fedler, Ditton, & Duda, 1998; Ross & Loomis, 1999).

Recently, there are new management challenges associated with emerging demographic changes in the population and increased participant diversity (Cordell, Betz, & Green, 2002; Murdock, Loomis, Ditton, & Hoque, 1996). Three different reasons were identified for current demographic changes: the reduced rate of population growth for traditional angling clientele, the aging of the population, and an increase of minority populations with historically low rates of recreational fishing participation (Hunt & Ditton, 2001, 2002; Murdock, Backman, Ditton, Hoque, & Ellis, 1992; Murdock et al., 1996; Toth & Brown, 1997). These demographic changes require that fishery agencies better understand the attitudes, behaviors, and preferences of their heterogeneous constituency groups if they are to be effective in socializing non-traditional participants to fishing. While the projected rate of increase in the angler population will not match population growth, the majority of net growth in angler numbers and expenditures will occur largely due to increases in the size of minority populations and immigration from other nations (Ditton, 2004; Murdock et al., 1996). From 1990 to 2050, the effects of increase in immigration and the minority population would account for over 85% of the future net growth in terms of number of participants (Murdock et al., 1996). In addition, according to Murdock et al. (1992), minorities could contribute to over 70% of the increase in anglers and account for about one half of fishing participants between 1990 and 2025 in Texas.

Another important management concern is recreationists' diversity resulting from current within-group angler differences based on the extent to which they have been socialized into fishing (i.e., recreation specialization) (Bryan, 1977; Ditton,

Loomis, & Choi, 1992). Previous studies of specialization have indicated that recreationists are not a homogeneous group and sub-groups vary in terms of behavior, experience, skill and the importance of the activity (e.g., Bryan, 1977; Ditton et al., 1992; Scott & Shafer, 2001). The disproportionate use of fishery resources by some anglers and support for and concerns about resource conservation of fishery resources further challenge fishery managers to achieve a more fair resource management of fishery stocks to be responsive to equity and equality concerns for resource use (Bohnsack, 2002; Manfredo, Vaske, & Sikorowski, 1996).

Whereas resource scarcity typically requires allocation decisions based on efficiency, which promote resource consumption to the most highly valued use (Manfredo et al., 1996), the issues of fairness and equality have been relatively ignored under the shadow of social utility maximization. Furthermore, because of dichotomous resource use, recreational resource use is always multidimensional and complex. Dichotomous resource use means that one use precludes another and there have been extensive disagreements on how the costs and benefits should be estimated with future generations in mind (Lee, 1993). When the maintenance of enjoyable social relations rather than economic efficiency and productivity become more appropriate as the management goal, fairness and equality should be the main principle of management decision making (Loomis & Ditton, 1993). Thus, factors that produce disproportionate demand for recreational fishing demand inevitably require consideration of inter-generational and intra-generational concerns (e.g., more attention to women, minority group members, urban dwellers, seniors and other non-traditional clientele) for fairness

matters in terms of sustainable use and conservation (Hunt & Ditton, 2001, 2002; Loomis & Ditton, 1993; Quinn, 1996).

Objectives

The purpose of this dissertation was to investigate the connected effects of how recreationists, recreational anglers in particular, foster their conservation attitudes and preferences toward natural resources, in light of within- and between-group diversity. Despite the considerable contribution of previous research to understanding recreationists' attitudes, motivations, and expectations for management and conservation, the literature has been limited in four main ways: (1) a lack of comprehensive understanding of recreationists' tradeoffs in their opinions and preferences for various management alternatives or options; (2) a partial measurement of conservation attitudes and preferences, measured mainly using indexed items like the "*new environmental paradigm*" scale; (3) a limited understanding of what kind of factors contribute to fostering conservation attitudes; and, (4) a lack of studies that explore behavioral and attitudinal differences by race and ethnicity using multivariate approaches to understand underlying dynamic patterns.

Accordingly, this dissertation explored anglers' attitudes and preferences for resource conservation in the integrated manner using two different multivariate analyses: a stated preference discrete choice model and a structural equation model. The goal was to better understand how conservation attitudes and preferences develop; explore comprehensive understandings of anglers' trade-offs, opinions, and preferences for

various management options; and identify attitudinal and preferential heterogeneity resulting from angler diversity (i.e., recreation specialization and race and ethnicity).

Conceptual Framework and Literature Review

Recreation Specialization

Numerous studies have segmented angler populations using surrogate behavioral and preferential categories such as organization membership (Gigliotti & Payton, 1993), place of residency to fishing location (Dalton, Bastian, & Jacobs, 1998), tournament participation (Loomis & Ditton, 1987; Wilde, Riechers, & Ditton, 1998), and species preference (Wilde & Ditton, 1999). These segmentation efforts are mainly one dimensional and usually do not provide a prediction difference and comprehensive explanation for group differences in variables independent of the classification variable (Ditton, 1996; Wilde & Ditton, 1994).

As an alternate means for understanding within-group diversity in conservation attitudes and preferences, recreation specialization has enjoyed a well-developed conceptual framework and empirical support since first described by Bryan (1977). Specialization, generally defined as a continuum of behavior reflecting differences in personal development and socialization (Bryan, 1977), provides a means for identifying angler group diversity. As level of angler specialization increases along a continuum, there is a focus shift from fish consumption concerns to resource conservation and more emphasis on the activity's nature and settings (Bryan, 1977; Ditton et al., 1992).

As recreationists become more familiar with on-site resource conditions, they are likely to be more sensitive to natural resource disturbances and degradation (Bryan, 1977; Ditton et al., 1992; Sutton & Ditton, 2001). Therefore, they are likely to show greater voluntary appreciation and support for conservation of natural resources (Bryan, 1977; Ditton et al., 1992; Hvenegaard, 2002; McFarlane & Boxall, 1996) and, express great understanding and support of resource management practices for reducing adverse user impacts on natural resource (Chipman & Helfrich 1988; Fisher, 1997; Oh & Ditton, in press; Teisl et al., 1996; Quinn, 1996; Salz, Loomis, & Finn, 2001). Consequently, high specialization recreationists likely place higher values (or costs) on particular natural resources that underlie their outdoor recreation activities as a result of the loss of those resources (Dalton et al. 1998; Sutton, Stoll, & Ditton, 2001; Oh, Ditton, Anderson, Scott & Stoll, 2005a).

Recreation specialization can also be used to explain racial and ethnic heterogeneity of recreational participation and environmental setting preferences (Ditton, 1996; Hunt & Ditton, 2001, 2002). Previous studies have identified racial and ethnic differences in preferred recreational activities, social and environmental settings, management practices and conservation attitudes (e.g., Washburne, 1978; Stamps & Stamps, 1985; Woodard, 1988; Taylor, 1989). Also, previous studies (Ditton, 2004; Hunt, 2000; Hunt & Ditton, 2001, 2002) have noted that minorities, with historically lower rates of recreational participation measured in terms of rates of participation and their relatively recent socialization into fishing, are more likely to be in specialization groups toward the lower end of the specialization continuum. Accordingly, we would

expect that heterogeneity of specialization level by race and ethnicity is also beneficial to explicate differences in environmental attitudes, levels of support for conservation, and environmental knowledge and awareness (Baas, Ewert, & Chavez, 1993; Noe & Snow, 1990; Taylor, 1989). Thus, an integration of the within group focus of recreation specialization with racial and ethnic diversity should provide a useful causal framework for testing theory-based explanatory elements derived from recreation specialization.

Despite its theoretical and implicational popularity for the last 30 years, there has been little agreement to date regarding the measurement of recreation specialization. For example, the early research efforts to assess recreation specialization was performed based on either behavioral (e.g., Dawson et al., 1992; Martin, 1997; Schreyer & Lime, 1984) or attitudinal perspectives (e.g., McIntyre, 1989; Shafer & Hammitt, 1995; Siegenthaler & Lam, 1992). Single-dimensional approaches for measuring recreation specialization fell out of favor due to a lack of attention to the variation of multidimensionality in recreationists' activity and were replaced with multi-dimensional approaches (Ditton, 2004; Manning, 1999; Scott & Shafer, 2001). Thus, the next generation of empirical studies have used both behavioral and attitudinal measures (e.g., Dyck, Schneider, Thompson, & Virden, 2003; McFarlane & Boxall, 1996; Salz et al., 2001).

Recently, the use of three dimensions of recreation specialization, namely, behavior (behavioral), skill and knowledge (cognitive) and commitment (psychological) as proposed by McIntyre and Pigram (1992), and Scott and Shafer (2001) appears to be widely embraced. McIntyre and Pigram (1992) first highlighted that the previous

specialization studies were limited in taking into account the affective dimension upon the measurement of specialization. Additionally, they captured skill and knowledge independently from the behavioral dimension as the cognitive dimension of specialization. Scott and Shafer (2001) subsequently substantiated the three dimensional approach after placing additional emphasis on an orientation to skill development. In general, as the behavioral dimension of specialization increases, so do the skill and knowledge and commitment dimensions (Manning, 1999). In this way, the specialization framework shows iterative circularity to mutually reinforce each measure, "in that development in one enhances the likelihood of reciprocal increase in the other" (McIntyre & Pigram, 1992: p. 4). Accordingly, this approach has been gaining its popularity in the recent empirical studies (e.g., McFarlane, 1996; Lee & Scott, 2004; Scott, Ditton, Eubanks, & Stoll, 2005; Scott & Thigpen, 2003).

Race and Ethnicity

Projected decreases in population growth, increased immigration, and an aging population, and increased numbers and proportions of minority residents are all expected to impact participation in recreational activities in the U.S. (Gramann & Allison, 1999; Murdock et al., 1996). Any net growth in angler numbers is projected to occur largely as a result of substantial increases in the size of minority populations and substantial immigration from other nations (Murdock et al., 1992; Murdock et al., 1996). Accordingly, the growing proportion of ethnic group members in the angler population will require a greater understanding of these subgroups and their wants and needs and

reexamination of assumptions about service priorities and provision (Ditton, 2004; Hunt & Ditton, 2001).

According to Manning (1999) and Floyd (2004), the research focus on race and ethnicity in outdoor recreation can be grouped largely into three categories: (1) those that discover differences in participation patterns between or among racial and ethnic groups, (2) studies that explore the explanations for the low level of outdoor recreation participation by minority ethnic groups, and (3) studies that investigate ethnic patterns in on-site use patterns and preferences. A number of studies have robustly identified that minority group members showed consistently lower participation in recreational fishing (e.g., Fedler et al., 1998; Pullis, 2000; Waddington, 1995). For example, using 2001 national survey data, participation rates of only 7% for African-Americans and Hispanic-Americans, respectively in recreational fishing were reported despite a 19% participation rate for Anglo-Americans (U.S. Fish & Wildlife Service, 2002). As a result, 93% of the anglers were Anglo-Americans and 5% were African-Americans or Hispanic Americans, respectively (U.S. Fish & Wildlife Service, 2002).

After recognizing the heterogeneous level of participation by ethnic groups, the research focus shifted to explaining the underlying reasons of minority under-participation in outdoor recreation (Manning, 1999; Gramann & Allison, 1999). Four different theoretical perspectives have been proposed in this regard: marginality, ethnicity (or subculture), assimilation, and discrimination (Floyd, 1998). Whereas assimilation is useful to explain intra-ethnic group differences (Floyd & Gramann, 1993; Shuall & Gramann, 1998), historical discrimination and segregation has been mainly

reflected in social patterns of marginality and subcultural differences (Hunt, 2000; West, 1989). Accordingly, the conventional theories of marginality and ethnicity have been used predominantly to explain low rates of participation by members of racial and ethnic groups.

Marginality theory maintains that poverty and limited access to socioeconomic resources contribute to minority groups' under-representation in outdoor recreation activities; ethnicity theory stresses racial and ethnic subcultural differences in norms, values and expectations (Allison, 1988; Hutchinson, 1987; Washburne 1978). Empirical findings in most studies (e.g., Bowker & Leeworthy, 1998; Carr & Williams, 1993; West, 1989) have not overwhelmingly supported either theory. Thus, the two theoretical perspectives are expected to interact with each other such as that marginality specifies subcultural recreation preferences (Hutchinson, 1988; West, 1989). However, since anglers in this dissertation were licensed, they have already negotiated various social and economic constraints and, enjoy some level of socialization in fishing. As a result, it can be reasoned that the marginality perspective is less likely or minimal. Additionally, by controlling the effects of various socio-economic variables, the role of subcultural theory can be assessed in that direct comparison of recreationists of comparable socioeconomic status can be made. Because this approach has been used previously and provided a viable explanation to measure heterogeneity of recreation behavior across diverse racial and ethnic groups (Allison, 1988; Manning, 1999), this method was also used in this dissertation.

Finally, several studies have shown perceptible behavioral and attitudinal differences among diverse ethnic groups in their preferences for recreational resource settings, perceived benefits of outdoor recreation and management practices, and conservational attitudes (e.g., Baas et al., 1993; Carr & Williams, 1992; Hunt & Ditton, 2001, 2002; Hutchinson, 1988; Stamps & Stamps, 1985). Hunt and Ditton (2001) tested 11 participation variables in recreational fishing and identified significant racial and ethnic differences for 10 participation variables (e.g., to have more years of fishing experience, to belong to a fishing club or organization, to fishing in tournaments). To explain racial and ethnic differences, Campbell (1989) identified the heterogeneous relationships between different cultural frameworks and fishing styles. He explained that whereas Anglo anglers with higher social status view fishing from a naturalistic perspective (i.e., fishing as leisure involvement for experiencing nature), minority groups with lower social status participate in the activity for product-driven reasons such as fish consumption.

The inclination to pursue different perceived benefits from an activity is also derived from diverse cultural patterns toward leisure and environmental orientation (Hunt, 2000; Simcox, 1993). According to Hunt and Ditton (2002), significant racial and ethnic differences between Hispanic-Americans and Anglo-Americans were reported on three of the four constructs related to the perceived benefits of fishing activity (e.g., escaping individual stressors, being in a natural environment). In western culture, individual accomplishment and personal needs through recreational activities are typically pursued based on the aspects such as activity, rationality and efficiency-

oriented; the passive or negative cultural connotations toward nature from non-western cultures place more values on societal group and family cohesiveness and belonging as well as emphasis on fishing for consumption (Hunt & Ditton, 2002; Simcox, 1993; Toth & Brown, 1997). Consequently, minority group members likely focus more on catching fish as well as family interaction and group affiliations while fishing (Campbell, 1989; Hunt & Ditton, 2002; Simcox, 1993; West, Fly, Larkin, & Marans, 1992).

Heterogeneous ethnic and racial involvement in fishing, perceived benefits, and perceptions of natural resources also produce different degrees of environmental attitudes, level of support for management activities, knowledge and awareness (Baas et al., 1993; Noe & Snow, 1990; Taylor, 1989). For example, as Taylor (1989) and Hunt and Ditton (2002) found, minority groups are less involved in environmental groups because their main concerns are with basic economic needs and the need for socially relevant environmental justice in their residence communities. Differing levels of fish consumption and perceptions of preferred natural settings have also been found to contribute to the diversity of conservation attitudes (Baas et al., 1993).

However, most previous studies used a single-dimensional comparison test to determine whether there were differences in leisure and recreation within racial and ethnic groups (e.g., Baas et al., 1993; Floyd, Shinew, McGuire, & Noe, 1994; Hutchinson, 1987; Hunt & Ditton, 2002). And, this approach was limited in exploring the systematic differences of a fostering mechanism that contribute to conservation attitudes by diverse racial and ethnic groups. A comparative research was needed for an

integrated and comprehensive understanding of racial and ethnic differences in conservation attitudes and what helps to shape them.

Environmental Attitudes and Behavior

Since Dunlap and Heffernan's (1975) study to suggest a proposition regarding an association between participation in outdoor recreation and environmental concerns, other research efforts can be categorized largely into two groups: (1) studies that attempt to confirm the proposition suggested by Dunlap and Heffernan with a framework of aggregate recreational activities, and (2) studies that assess the proposition using recreationists' diversity or within-group differences, for example, using recreation specialization in the context of a single recreation activity.

In the first area of research inquiry, studies have examined whether participation in outdoor recreation activities leads to an increase in environmental concerns and behaviors based on an empirical analysis, in which recreation activities were classified into major groups such as appreciative (e.g., hiking) and consumptive (e.g., hunting, fishing) (e.g., Dunlap & Heffernan, 1975; Jackson, 1986; Pinhey & Grimes, 1979; Thapa & Graefe, 2003; Theodori et al., 1998; Van Liere & Noe, 1981). Most of these and subsequent studies, however, have not provided definitive support for the proposed relationship except for a few research by Jackson (1986) and Thapa and Graefe (2003).

To explain the inconsistent findings for an association between outdoor recreation and environmental attitudes, three main reasons are suggested. First, the conceptual framework of aggregate recreational activities simply classified as, for

instance, appreciative and consumptive activities (Dunlap & Heffernan, 1975), may not be appropriate for understanding recreationists' heterogeneous characteristics of conservation attitudes and behaviors (Tarrant & Green, 1999; Theodori et al., 1998). Second, and perhaps more importantly, according to Katz (1981), Tarrant and Green (1999), Thapa (2000), and Van Liere and Noe (1981), recreationists' diversity or within-group differences, especially socioeconomic or recreation specialization level differences, was often disregarded in previous empirical analyses. Third, maintenance of the same measurement level of specificity or generality for both attitudes and behaviors has been frequently overlooked, as Fishbein and Ajzen (1975), Scott and Willits (1994), and Wall (1995) have pointed out.

Other studies dealing with environmental concerns in terms of within-group diversity (e.g., recreation specialization) in a single recreation activity, accordingly, have been much more successful in confirming the proposition that some constant level of participation in outdoor recreation activities contributes to an increased level of environmental concern and behavior (e.g., Hvenegaard, 2002; Fisher, 1997; Virden & Schreyer, 1988). Previous studies, which examined the relationship between recreation specialization and environmental concerns, have supported convincingly a positive relationship toward increasing concern for resource conservation with an increasing level of specialization (Katz, 1981; Kauffman, 1984; Mowen, Williams, Graefe, 1996). The basic logic here is that more specialized recreationists have become more aware of their own potential for resource disturbance, and thus have a more holistic view of natural resources and the need for attentive management. Consequently, they are likely

to have greater concern for reducing adverse user impacts on natural resources and place a higher value on particular natural resources for resource conservation than others (Bryan, 1977; Ditton et al., 1992; Fisher, 1997; Oh et al., 2005a).

As Ajzen and Fishbein (1980), Scott and Willits (1994) and Tarrant and Green (1999) have noted, in general, there is a lack of congruence or specificity commonly reported in examining the relationships between attitudinal and behavioral measures. Accordingly, recreationists in a single activity are more likely to be susceptible to environmental alterations where their activity is practiced. Thus, an association in the context of a single activity is generally stronger between outdoor recreation and attitudes toward specific parts of the environment necessary for participating in that activity rather than between outdoor recreation and attitudes toward more remote or general environmental issues (Jackson, 1986; Wall, 1995). Thus, it is more credible to focus on decoding recreationists' conservation attitudes and behaviors in specific environmental settings related to a particular recreational activity in the recreation specialization context.

Those studies used a basic manner of economic terms (e.g., willingness to donate to conservation). While studies in the first category of research inquiry using a framework of aggregate recreational activities typically used standard measures such as *new environmental paradigm scale* developed by Dunlap and Van Liere (1978) or *environmental concern scale* by Weigel and Weigel (1978), studies using the recreation specialization framework have relied on one or two of the following approaches: (1) understanding whether anglers support or oppose management restrictions using opinion

measurement (e.g., Chipman & Helfrich, 1988; Fisher, 1997; Quinn, 1992; Quinn, 1996; Salz et al., 2001; Teisl, Boyle, & Roe, 1996); and (2) identifying the general level of voluntary support for natural resource conservation (e.g., Aas & Kaltenborn, 1995; Holland, Ditton, & Graefe, 1998; Sutton & Ditton, 2001; Virden & Schreyer, 1988). Generally, studies that investigate anglers' support for management restrictions seek to enhance managers understanding of the impacts of management regulations by constraining anglers' behavior and their resource uses such as fishing harvest. Studies that measure anglers' voluntary support seek to improve understanding and prediction of anglers' common thoughts and actions toward resource conservation based on their voluntary behaviors (Ditton, 1996).

With regard to the measurement of conservation attitudes, the concept of economic benefits has not been used previously as an attitudinal measure (or as a behavioral intention) except in a few studies (e.g., Hvenegaard, 2002; McFarlane & Boxall, 1996). Although an economic perspective was often disregarded in most recreation research dealing with conservation attitudes and behaviors, Willingness-To-Pay above trip costs (WTP) estimated from nonmarket valuation methods can be a good measure of attitudinal variables that influences behavior intentions or actual behaviors (Kahneman, Ritov, Jacovitz, & Grant, 1993). WTP quantifies anglers' net benefits (or consumer's surplus) derived from direct and indirect values of current and future resource use by consuming non-tradable fishing services (Edwards, 1990; Huppert, 1983). WTP is typically regarded as a behavioral intention rather than an attitudinal measure (e.g., Barro, Manfredo, Brown, & Peterson, 1996; Kerr & Cullen, 1995).

However, it can be also viewed as an attitudinal measure because WTP is a “good cause” that needs supporting for the protection of the environment rather than a simple value to determine how much a environmental good is worth to recreationists (Kahneman et al., 1993). According to Pouta and Pekola (2001), while WTP can be considered a behavioral intention, “the critics of Contingent Valuation (in other words, WTP) have argued that CV measures only general attitude toward the good and not the intention of pay or supporting a policy” (p. 96).

In this dissertation, it was not a goal to decide whether WTP should be viewed as an attitudinal measure or a behavioral intention. Instead, it was assumed that in the model of the causal chain towards conservation behaviors, WTP as an attitudinal measure is affected by indicators such as personal norms and motivations as well as awareness of consequences (Widegren, 1998). Thus, it was incorporated as a good explanatory variable for predicting conservation behaviors in conjunction with other attitudinal measures. Additionally, in terms of the maintenance of congruence or specificity, WTP is a good determinant of behavior since it is well-suited to the specificity issue between specific conservation attitudes and behaviors for a good correspondence of activity-specific attitude to behavior (Barro et al., 1996; Fishbein & Ajzen, 1975; Pouta & Pekola, 2001). Despite the close interconnectivity of abovementioned elements and the consequent advantages of using multi-dimensional measures for understanding collective support for resource conservation, WTP has not been used, probably due to disciplinary boundaries in the social sciences.

Purpose and Organization of the Dissertation

This dissertation sought to develop a causal flow based on theory-oriented foundations to better understand the existing process of conservation attitudes and preferences and identify primary reasons for attitudinal and preferential heterogeneity resulting from within and between angler group diversity. In addition, multi-dimensional measurement of conservation attitudes and preferences was used to help explain the relationships between attitudinal and behavioral domains through several endogenous (i.e. intermediate) dimensions of wants and needs (i.e., perceived benefits and consumptive orientation). Finally, study results are intended to help fishery managers to achieve their parallel objectives of resource conservation and recreational use. To achieve these objectives, three stand-alone research papers (Chapters II - IV) are presented. Each of these chapters evaluates selected topics by means of two major themes: recreationists' conservation attitudes and recreation specialization.

Chapter I contains an introduction and a literature analysis to provide theoretical perspectives for exploring recreationists' attitudes and preferences for resource conservation as a result of their respective levels of recreation specialization in an outdoor recreation activity (in this case, recreational fishing). Chapter II is titled "*Specialization Differences in Anglers' Preferences for Harvest Regulations.*" This chapter investigated how specialization-segmented angler groups respond to proposed management options (which are considered a sub-dimension of conservation attitudes and preferences) using a stated preference discrete choice approach. This study is expected to identify feasible management options that maximize angler satisfaction

while at the same time insuring long-term fishery sustainability. In contrast to most previous research designs that make use of opinion measurement methods (Smith, 1983) or revealed preference methods (Louviere, 1988), a stated preference discrete choice approach was thought to be beneficial for deriving an understanding of anglers' overall preferences and trade-offs for management option attributes.

Chapter III is titled "*Understanding Anglers' Conservation Concerns Using Recreation Specialization.*" This chapter explored the causal relationships between sub-dimensions of recreation specialization and anglers' attitudes and preferences for resource conservation and current resource requirements. A causal structure modeling approach was thought to be advantageous in that other intermediate dimensional factors (regarded as dependent factors in most previous recreation specialization studies) can be included as endogenous factors for testing the causal mechanism of recreationists' development of conservation attitudes. These factors included consumptive orientation, activity-specific experience preferences, and activity-general experience preferences.

Chapter IV is titled "*Effects of Race and Ethnicity on Conservation Concerns.*" This chapter examined how theoretically-driven explanatory factors influence anglers' conservation attitudes and preferences for particular racial and ethnic groups. Previous research has focused on discerning racial and ethnic group differences in recreational behavior, attitudes, and preferences instead of exploring the causal ordering relationships of factors to identify underlying mechanisms. The purpose of this study was to identify attitudinal and preferential differences and the discrepancies in conservation attitudes

among different racial and ethnic groups so that our understanding of anglers' support for fishery management and resource conservation can be enhanced.

Finally, Chapter V integrated study findings from the three research papers as well as previous research; conclusions were reached regarding recreationists' attitudes and preferences toward resource conservation; study limitations were identified and discussed; and, finally a research agenda was developed for additional work in this area in addition to discussion of management implications.

CHAPTER II

SPECIALIZATION DIFFERENCES IN ANGLERS' PREFERENCES FOR HARVEST REGULATIONS

Introduction

Due to the nature of fishery stocks as common property resources (Titenberg, 2000), management agencies are required to enforce various management restrictions. Also, the uneven use of fishery resources and various preferences for resource management within the angler population further complicate efforts to attain the dual management goals of maximized angler satisfaction while sustaining fisheries resource. Accordingly, as constraints on recreationists' behavior and resource use become a common goal of management strategies, managers have shown an increasing interest in understanding angler preferences for various management alternatives. According to Wilde and Ditton (1999), anglers' support for management regulations is based primarily on how their fishing experiences will be affected by changes in regulations. Thus, it is critical that fisheries managers should have a scientific knowledge of understanding, evaluating and predicting anglers' support for current and proposed management regulations to the greatest practicable extent (Aas, Haider & Hunt, 2000; Oh, Ditton, Gentner, & Riechers, 2005b; Wilde & Ditton, 1994).

A typical research design such as public opinion measurement (Smith, 1983) requires individuals to reveal their preferences for each item of rule making and concern, one at a time (e.g., releasing fish below a certain length, retaining a certain number of

fish). Notwithstanding that this approach has been widely used in support of management decision-making, it has been criticized because it often produces support for the management status quo or results in a lack of comprehensive understandings of anglers' "trade-offs" in opinions and preferences for management regulations. Alternatively, a stated preference discrete choice approach elicits anglers' preferences by making use of a set of hypothetical choice sets in combination with the most important attributes and consequent levels (Boxall, Adamowicz, Swait, Williams, & Louviere, 1996; Louviere, Hensher, & Swait, 2000). Based on the rational assumption that anglers make their decisions on multi-attributes of fishing products viewed simultaneously (Schroeder & Louviere, 1999), the stated preference discrete choice method (SPDCM) is useful for understanding anglers' holistic preferences and allowing for trade-offs among regulatory attributes together with inserted expectation attributes. This approach has been used in the context of recreational fishing previously to explore angler preferences for current or proposed harvest regulations (e.g., Aas et al., 2000; Gillis & Ditton, 2002; Hicks, 2002; Oh et al., 2005b).

However, previous studies using the SPDCM were limited due to an assumption of homogeneous preferences by an average angler. The diversity, among anglers in terms of the extent to which they have been socialized into fishing and hence have become specialized, provides important management implications (Ditton, 2004; Fisher, 1997). Previous studies have indicated that recreationists are not a homogeneous group and sub-groups vary in terms of behavior, experience, skill and the importance of an activity (e.g., Bryan, 1977; Ditton et al., 1992; Scott & Shafer, 2001). As an effective

market segmentation tool, recreation specialization has been used widely with robust theoretical and empirical supports since its initiation by Bryan (1977). In the context of recreation fishing, anglers have been segmented by specialization for examining variations in experiential preferences, consumptive orientation, management support, and conservation attitudes (e.g., Chipman & Helfrich, 1988; Ditton et al., 1992; Fisher, 1997; Salz et al., 2002). The biggest advantage for using specialization is that it can enhance a manager's understanding of group differences (i.e., diversity) on a variety of issues that enable them to improve service delivery (Driver, 1985; Fedler & Ditton, 1994). Also, as Driver (1985) indicated, the separation of user groups with different motivations and behaviors can help differentiate "recreation products" with clientele-modified characteristics.

Using the recreation specialization framework, it would be expected that various preferences for management interventions are preferred to a lesser or greater extent among participant sub-groups along a continuum. Numerous studies have focused on recreationists' heterogeneous attitudes, opinions and preferences for environmental settings using the concept of specialization in birdwatching (e.g., Hvenegaard, 2002; McFarlane & Boxall, 1996; Martin, 1997), hiking (e.g., Virden & Schreyer, 1988), mountaineering (Dyck et al., 2003), and fishing (e.g., Chipman & Helfrich, 1988; Ditton et al., 1992; Fisher, 1997). Nevertheless, the subject of enforcing management restrictions, different from general environmental settings, has not drawn sufficient studies to capture recreation specialization into understanding opinions and preferences for proposed rules and regulations in a comprehensive manner. Therefore, the objectives

of this paper were to: (1) understand anglers' opinions and preferences for management harvest restrictions using stated preference choice modeling; (2) identify anglers' opinions and preferences by group segments using the recreation specialization framework; and, (3) suggest feasible management options for management regulations that maximize angler satisfaction while conserving the limited fishery resources in a sustainable manner.

This study, however, is different from the abovementioned studies in two different ways: (1) none of the studies have taken into account angler diversity as a means for understanding angler preferences for management regulations; and, (2) In contrast to a typical situation of scarce fishery resources, there is an abundance of red drum stocks in Texas because of strict conservation measures implemented previously. Although fisheries managers may be reaching a point where they can consider an increase in recreational harvest, the lack of information on angler preferences and the tradeoffs they are willing to make in their trip decision making will not guarantee efficient fishery management that avoids over exploitation of fishery resources and maximizes angler satisfaction with their fishing trips.

Recreation Specialization

As an effective market segmentation approach, recreation specialization proposed by Bryan (1977) has been gaining in popularity for understanding multidimensional aspects of anglers' attitudes and behavior. Bryan (1977) observed trout anglers in Wyoming and segmented four different groups: occasional angers, generalists,

technique specialists, and technique-setting specialists by their frequency of participation, setting preferences, technique preferences, choice of equipment, the importance of catching fish, social setting of the activity, and fishery resource management preferences. Although Bryan's introduction of a new conceptual framework twenty-eight years ago has stimulated numerous research efforts (e.g., Chipman & Helfrich, 1988; Virden & Schreyer, 1988), however, conceptualization and measurement of recreation specialization have been important research agenda. Thus, diverse efforts were made not only to redefine recreation specialization in terms of social worlds (Ditton et al., 1992) but also to segment groups by a single dimension of a behavioral focus (e.g., Martin, 1997; Schreyer & Lime, 1984; Schreyer, Lime, & Williams, 1984;) and of an attitudinal focus (e.g., McIntyre, 1989; Siegenthaler & Lam, 1992; Shafer & Hammitt, 1995) and by a multidimensional aspect (e.g., Chipman & Helfrich, 1988; Fisher, 1997; McFarland & Boxall, 1996; Salz et al., 2001). Although disagreement remains on the definition and measurement of the concept, contemporary studies have supported generally the measurement assessment based on multidimensional scale in terms of both behavioral and attitudinal indicators to avoid inconsistencies with a single-dimensional use (Kuentzel & McDonald, 1992; McIntyre & Pigram, 1992; Scott & Shafer, 2001). Consequently, recent specialization studies (e.g., Lee & Scott, 2004; McFarlane, 1996, 2004; Scott et al., 2005) make use of three dimensions with a behavioral component, a cognitive component measured by skill and knowledge, and a psychological component measured by commitment (McIntyre &

Pigram, 1992; Scott & Shafer, 2001). This approach was also used for the segmentation process in this study.

A focus shift becomes salient from fish consumption to preservation and thus there is greater emphasis on the activity's generic nature and environmental setting (Bryan, 1977; Ditton et al., 1992; Fisher, 1997; Katz, 1981), as level of specialization in fishing activity increases. Specialized recreationists are more likely than others to perceive resource disturbances, which result in their higher costs of natural resource loss. Consequently, they are more likely to report higher Willingness-To-Pay (WTP) values than low specialization anglers because WTP is an assessed value for amenities derived from the fishing experience (Oh et al., 2005a). Accordingly, they show greater appreciation of and support for resource management practices in an effort to reduce the adverse user impacts on natural resource. Overall, the understanding and support of management restrictions are closely connected to recreationists' concerns of resource conservation.

Despite numerous studies, which have attempted to discover empirical support for management measures and conservation concerns separately, however, there has been less interest in an integrating understanding of these issues. Using the recreation specialization concept, heterogeneous angler segments are expected to show different patterns of within-group preferences for management alternatives as an expression of their increasing commitment to the activity. Given the need for constantly changing harvest restrictions, it can be reasoned that anglers consider their preferences for restriction changes along with their concern for long-term sustainability of fisheries

stock (Gillis & Ditton, 2002; Oh et al., 2005b). In addition, heterogeneous differences by specialization group are expected in attitudes, opinions, and preferences for management practices in combination with their simultaneous interests in resource conservation. Thus, the study focus was to integrate the specialization concept into an understanding of heterogeneous preferences for fishing management interventions.

Methods

Instrumentation

This study was conducted with the sample of red drum anglers who make use of Texas coastal waters. A two-step process was used to identify and reach this group. An initial survey with resident license holders who fish in Texas waters was conducted in 2002 (Anderson & Ditton, 2003). The mail questionnaire collected data on anglers' freshwater and saltwater fishing participation, motivations, attitudes, management preferences, and fishing trip expenditures (for the complete survey, see Oh and Ditton, 2003 for the complete survey). To represent the behavioral and attitudinal components for recreation specialization, eight variables were used (e.g., total number of days in fishing for the behavioral dimension, self-evaluated fishing skill for the skill and knowledge dimension, and replacement cost for fishing equipment owned by angler for the commitment dimension). Each variable was standardized to a mean of 0 and a standard deviation of 1 for the subsequent analyses. One question was included in the survey to identify a sample (N = 1,377) of anglers with a first, second, and third choice preference for red drum fishing for follow-up purposes.

In 2003, a follow-up mail questionnaire was sent to ask about their red drum fishing trip preferences using a stated preference choice experimental design. The SPDCM included the important attributes and levels for each attribute. Based on a series of discussions with Texas Parks and Wildlife Department (TPWD) fishery managers as well as previous angler preference studies (e.g., Aas et al., 2000; Gillis & Ditton, 2002; Hick, 2002; Smith, 1983), four types of restrictions (i.e., *bag limit, minimum size limit, maximum size limit*, and *retention of big fish*) were included as policy attributes. Furthermore, non-regulatory attributes were included so anglers could predict simulated outcomes based on management changes affecting their future fishing trips (Aas et al., 2000; Fedler, 1998; Gillis & Ditton, 2002; Hicks, 2002; Oh et al., 2005b). For that reason, three expectation attributes were included in the study: *average fish size sought*, *catch probability*, and *travel cost per day*. A more detailed description of each attribute is presented in Table 1.

TABLE 1

Proposed Attributes and Levels

	Attribute	Description	Level
Restrictions	Bag limit	The number of red drum that an angler can retain per day	1. 3* 2. 4 3. 5
	Minimum size limit	The minimum size of red drum that an angler can legally retain	1. 18'' 2. 19'' 3. 20''*
	Maximum size limit	The maximum size of red drum that an angler can legally retain	1. 28''* 2. 29'' 3. 30''
	Retain big fish	Each fishing year, an angler can retain one fish over the current maximum length (28"using a tag provided by TPWD)	1. two fish over the maximum size per year* 2. five fish over the maximum size per year 3. seven fish over the maximum size per year
Expectations	Average fish size	Anglers' expectations regarding size of red drum caught	1. Smaller 2. Same as usual 3. Larger
	Catch Probability	The expected number of red drum that an angler catches on a typical fishing day	1. about the same 2. one more fish caught 3. two more fish caught
	Travel cost / day	Travel cost that an angler spends for a fishing trip per day (including gas and other trip expenses)	1. 25% less than your current total cost per day 2. Your current total cost per day 3. 25% more than your current total cost per day

* The underlined levels reflect current state agency fishing regulations.

Once attributes were identified, three levels for each attribute were selected to secure sufficient variations in the policy options considered. Each management attribute included the current level of the management regulation as the base level. Based on a pretest conducted with members of a local fishing club who targeted saltwater species, minor revisions were made such as a revision of trip cost from using actual U.S. dollar values to percentage changes from current trip cost per day. This better captured concerns regarding differences in expenditure patterns across anglers.

ATTRIBUTE	Trip A	Trip B	
BAG LIMIT	*5*	*4*	
MINIMUM SIZE	*20''*	*19''*	
MAXIMUM SIZE	*30''*	*30''*	
RETAIN BIG FISH	*Two fish over maximum size per year*	*Two fish over maximum size per year*	
AVERAGE FISH SIZE	*Same as usual*	*Same as usual*	
CATCH PROBABILITY	*One more fish caught*	*About the same*	
TRIP COST / DAY	*Your current trip cost / day*	*25% less than your current trip cost / day*	
Which trip do you prefer? (circle only one)	**TRIP A**	**TRIP B**	**I would not take either trip**

Figure 1. An Example of a Choice Set Sent to Respondents

Fractional factorial designs, which generate a tractable number of choice sets, involved reducing the number of trip profiles needed to estimate the desired effects while maintaining the orthogonality of the full factorial (Bennett & Adamowicz, 2001). Furthermore, a blocking design was added to segment the choice sets into blocks (or

versions) to reduce respondent burden (Bennett & Adamowicz, 2001). As the number of attributes increases, the likelihood for higher-order effects also increases and these higher order effects should be included in the design (Louviere et al., 2000). The fractional factorial design with two-way interactions led to the generation of 80 choice sets that were divided into 10 blocks of 8 paired trip comparisons. Figure 1 provides an example of one choice profile. To be realistic, each choice set included the ability to opt out or not take either trip (Bennett & Adamowicz, 2001).

Models

SPDCMs attempt to estimate the utility associated with individual's evaluations on a designed set of multi-attribute fishing trips based on random utility theory (Holmes & Adamowicz, 2003). When it is reasonably assumed that individuals make choices to maximize utility (Manski, 1977), random utility theory indicates that utility is estimated through an indirect utility function comprised of a deterministic component and a random error component (Louviere, 1988; Louviere et al., 2000). The indirect utility function of a representative angler across the choice of fishing trip j can represented as

$$U_j = V_j(A) + \varepsilon_j$$

where U_j is the utility of fishing trip j, V_j is the deterministic component of utility to be estimated, A is the attribute vector, and ε_j is unobservable error component of utility. Through utility maximization, an angler will choose trip j over some other trip i if $U_j > U_i$. Assuming the error terms are independently and identically Gumbel-distributed, the probability of choosing trip i is (Ben-Akiva & Lerman, 1985; McFadden, 1974):

$$P(i \mid i \in M) = \frac{\exp(\mu V_i)}{\sum_{j=M} (\mu V_j)}$$

where M is the set of all trip scenarios included and μ is the scale parameter, which is typically set to one for parameter estimation. This specification is known as the conditional logit model and the distributional assumption for this model requires the satisfaction of independence of irrelevant alternatives (IIA) property. This property requires that an individual's choice probability across one alternative does not depend on the choice probability of any other alternative (Ben-Akiva & Lerman, 1985).

To take into account heterogeneous preferences of angler clientele, three different approaches have been widely used. The first approach is to include the parameter estimation of socioeconomic variables in a conditional logit model. These variables can be estimated by interacting with alternative-specific attributes to capture individual factors because they are invariant across alternatives of a choice set. This approach has been used popularly to incorporate preference heterogeneity (e.g., Morrison, Bennett, & Blamey, 1999; Bauer, Cyr, & Swallow, 2004). However, this method is limited in that key individual variables that lead to heterogeneity must be, *a priori*, appropriately selected to avoid many parameters. Consequently, the use of more complex variables from a theoretical base is often constrained (Holmes & Adamowicz, 2003; Swait, 1994).

The second is random parameter logit modeling (or mixed logit modeling). Based on the assumption that parameters are randomly distributed in the population, a distribution for parameter estimates (such as commonly normal or lognormal

distribution) is specified (Holmes & Adamowicz, 2003; Train, 2003). Then, multiple estimates of a parameter, which provide the mean and variance of the random parameter distribution, explain heterogeneity in the sample (Holmes & Adamowicz, 2003). Although the method has been used to incorporate heterogeneity of recreationists' preferences in several studies (e.g., Breffle & Morey, 2000; Train, 1998), it is possibly limited in explaining the underlying sources of heterogeneity, which are commonly related to the characteristics of individual anglers (Boxall & Adamowicz, 2002).

The third is a segmentation approach that uncovers underlying latent classes or segments (i.e., latent class choice approach or cluster analysis approach). Because the segments (to which anglers belong) have different preference structures affected by attitudinal and behavioral information that correspond to recreation specialization (Swait, 1994), this method is advantageous over the aforementioned ones and was used in this paper. While both the latent class choice method and cluster analysis approach make use of segment classification, the former, for example, uses a separate logit model to identify segmented angler groups and the latter employs, namely, K-means cluster analysis. In addition, the latent class choice method is a simultaneous estimation process that uses joint probability such that each angler belongs to a certain segment and chooses a fishing trip; the cluster analysis approach is a two-step process that uses K-means cluster method first to determine specialization segments and then uses a stated preference choice model to explain and predict preferences of each segmented group (Salomon & Ben-Akiva, 1983; Swait, 1994). One additional difference between these two methods is the way the number of population segments is determined: use of a

statistical testing procedure with the latent class choice approach and reliance on researcher judgment based on the desirable quality of the segments obtained as well as previous applications with cluster analysis approach. Although estimation results were made using both methods, the former approach did not provide coherent results with non-significant specialization variables and, consequently, the latter approach was used here with good results and unproblematic interpretation.

Results

Of the 1,377 questionnaires mailed, 791 replies were received for a raw response rate of 57.4% using a modified Dillman Total Design Survey Method (Dillman, 1978). When non-deliverables were deleted, the effective response rate was 59.8%. Respondents and non-respondents were compared using two different data sets collected in 2001 and 2003, respectively. In general, across sociodemographic characteristics and general fishing behavior variables, respondents were older, had higher incomes, were more skilled and attributed more importance to fishing compared to other recreational activities, than non-respondents. No significant differences were detected between respondents and non-respondents for other questions (e.g., total cost of fishing trip, total fishing days in saltwater, compared fishing ability, and the level of fishing satisfaction). Caution should be used in generalizing the study results to the angler population as these variables could be related to fishing avidity, which may influence responses to other questions. Of the 791 respondents, 20 were deleted due to insufficient answers in choice sets and 249 were deleted because of missing values for specialization variables used.

Thus, the final data set included the total responses of 522, which produced 4,176 choice sets for analysis.

Confirmatory factor analysis (CFA) was used to test the theoretical foundation of recreation specialization with the three dimensional model suggested by McIntyre and Pigram (1992) and Scott and Shafer (2001). Using EQS 6.1, the CFA was implemented with eight variables to identify specialization levels: total days fished in the last 12 months (TDAYFISH) and total days fished in saltwater in the last 12 months (TDAYSW) for *the behavioral dimension*; self-perceived skill level in general fishing (ABILITY), self-perceived skill in saltwater fishing (ABILESW), and subjective constraint level of developing fishing skill (CSKILL) for *the skill and knowledge dimension*, and importance of fishing compared to other activities (COMPARE), member of a fishing club or organization (CLUB), and expenditure amount of fishing equipment (EQUIP) for *the commitment dimension*. The overall Cronbach's alpha was 0.68 for reliability and the other goodness fit indices indicated a good fit for the proposed measurement model (e.g., the Comparative Fit Index = 0.96, the Non-Normed Fit Index = 0.94 and the Standardized Root Mean Squared Residual = 0.03). While detailed results were reported in APPENDIX A, individual *t*-values which ranged from 6.32 to 24.71 confirmed that all factor loadings were significant ($p < .001$) and, conseqeuntly, provided evidence supporting the convergent validity (Hatcher, 1996).

TABLE 2

Mean Value of Variables by Cluster Level of Recreation Specialization

Variable	Level of Specialization		
	Casual (cluster 1)	Intermediate (Cluster 2)	Advanced (Cluster 3)
	n=261	n=206	n=55
TDAYFISH	23	33	104
TDAYSW	11	20	74
ABILESW	1.48	2.33	2.25
ABILITY	3.24	4.43	4.07
CSKILL	3.75	4.58	4.36
COMPARE	2.70	3.25	3.58
EQUIP	6.12	13.50	21.59
CLUB	0.10	0.34	0.53

K-mean cluster analysis based on three dimensions generated three groups. A descriptive summary of the three different clusters is provided in Table 2. Cluster 1, 2, and 3 are referred to as casual, intermediate, and advanced anglers, respectively. Mean values of the three different angler groups demonstrated the heterogeneity of the groups. Despite slight inconsistency between intermediate and advanced anglers in the skill and knowledge dimension, intermediate and advanced anglers were more likely to rate their fishing ability higher and report their constraint level of fishing skill lower (from the reverse code of the original item). In addition, the advanced group was more likely to spend more fishing days, expend more money on fishing-related equipment, participate in tournaments and clubs, and attribute more importance to fishing activity.

The Results of the Stated Preference Choice Models

The conditional logit model was used to estimate four different preference models including a pooled model for all anglers. To test the violation of the IIA property, the likelihood ratio test between the conditional logit (restricted) model and the nested logit (unrestricted) model was conducted and failed to reject the null at $p < .05$ (Greene, 2000). Of the five interaction effects, which were added to improve the explained variance, two secondary effects were included based on the preliminary estimation result (see more details for Oh et al., 2005b). A likelihood ratio test indicated that the model with interaction effects was superior to that with main effects only for the all-angler, casual-angler, and intermediate-angler models. However, secondary effects were not included in the advanced-angler model because of no difference with the main effect only model based on the test ($\chi^2 = 1.43$, $p = 0.49$).

The explanatory power of the all-angler model was relatively high with a goodness-of-fit measure of McFadden's ρ^2, 0.19, which is an analogous to the R^2 in a conventional regression model (Greene, 2000). All effects of the primary attributes were statistically significant ($p<0.05$) in the model. ASC was set to be an alternative specific constant, which represents the utility shift of "no trip" to the basic alternative of participation in a fishing trip (Table 3). The negative value for ASC indicated that not taking the fishing trip was less preferred to taking the fishing trip under the current fishing rules and regulations. Besides the attribute of RETAIN, which represents to "retain more fish larger than the maximum size limit", all other attributes had the expected signs. While an increase in bag limit and maximum size limit was likely to lead

to considerable increases in fishing trip participation, a decrease in minimum size limit was preferred. Likewise, a strong preference was revealed for increasing catch probability and average fish size. However, contrary to expectations, the negative coefficients of the RETAIN attribute indicated that anglers were likely to prefer the current two fish over 28" maximum size per year regulation" over the other options presented in consideration of their future fishing trip participation. Two interaction effects, which showed the modification effect of those two attributes on fishing trip participation, were likely to alleviate the strong positive effects of each attribute.

Each specified model of heterogeneous specialization segments, however, showed different patterns of explanatory powers and significant variables as expected. A goodness-of-fit measure of McFadden's ρ^2 indicated 0.14 for the advanced angler group, 0.19 for the intermediate angler group, and 0.23 for the casual angler group with the inclusion of management and expectation attributes (Table 3). Thus, it was noted that the model for the casual angler group indicated a better fit (i.e., analogous to a greater portion of explained variation) than those for the intermediate and advanced anglers. Although most variables were statistically significant with the same expected signs, some were not: MAXIMUM and the interaction effect between CATCH and BAGLIMIT for casual anglers, ASC and MINIMUM for intermediate anglers, and MINIMUM, MAXIMUM, AVERAGE3, and CATCH for advanced anglers were not statistically significant (Table 3). Overall, advanced anglers were less interested in relaxing current harvest restrictions, while casual anglers showed a strong preference for catching more numbers of red drum by relaxing current harvest restrictions.

TABLE 3

Results of Conditional Logit Model

Variable	All Anglers		Specialization Level					
			Casual Angler		Intermediate Angler		Advanced Angler	
	Estimated Coeff.	Z-value	Estimated Coeff.	Z-value	Estimated Coeff.	Z-value	Estimated Coeff.	Z-value
ASC	-0.7077	-3.45**	-1.2757	-4.35**	-0.1747	-0.53	-1.009	-2.47**
BAGLIMIT	0.4779	5.77**	0.3891	3.30**	0.5909	4.47**	0.2724	2.84**
MINIMUM	-0.1077	-3.40**	-0.1811	-4.03**	-0.0115	-0.23	-0.1134	-1.15
MAXIMUM	0.1591	2.10**	0.0879	0.79	0.2359	1.92*	-0.0079	-0.09
RETAIN	-0.0939	-8.05**	-0.0783	-4.69**	-0.0887	-4.79**	-0.2153	-5.96**
AVERAGE2	0.3668	5.90**	0.3396	3.88**	0.3690	3.64**	0.4413	2.33**
AVERAGE3	0.6444	9.49**	0.5844	6.06**	0.7749	7.12**	0.3467	1.62
CATCH	0.4408	5.76**	0.4582	4.19**	0.4663	3.87**	0.1475	1.56
TRIPCOST	-0.0256	-19.15**	-0.0262	-13.86**	-0.0247	-11.61**	-0.0264	-6.11**
MAX*BAG	-0.0936	-2.64**	-0.0658	-1.30	-0.1296	-2.30**	N/A	
CATCH*BAG	-0.1277	-3.60**	-0.1025	-2.03**	-0.1774	-3.16**	N/A	
McFadden ρ^2	0.1943		0.2336		0.1860		0.1353	

* indicates the statistical significance at 10% level
** indicates the statistical significance at 5% level.

Assessing the Management Options

A further benefit of the stated preference discrete choice method is that it provides systematic information on whether anglers will be better or worse off depending on changes in feasible management options. Based on diverse management scenarios derived from different combinations of levels and attributes, the utility (or satisfaction) gain or loss is measured by predicted probabilities and willingness-to-pay. The predicted probabilities were computed using as $P(i \mid i \in M) = \frac{\exp(V_i)}{\sum_{j=M} \exp(V_j)}$ and overall willingness- to-pay (WTP) values using $\frac{1}{\beta_{\text{trip cost}}}(V_C - V_N)$ as suggested by Hanemann (1984). Here, V_C and V_N indicates the indirect utility before and after the changes in management regulations.

A set of five different fishery management scenarios for anglers' preferences were obtained based on discussions with fishery managers and subsequently predicted probabilities and overall WTP values were calculated (Table 4). Scenario1 was the base status quo option or the current management conditions for policy attributes and Scenario5 was the most preferred option with a relaxation of rules and regulations prior to the analysis. It was notable that expectation attributes of CATCH, AVERAGEs, and TRIPCOST were constrained to be the current level in all scenarios to compare heterogeneous preferences for management options among segmented groups without subjective biases. The scenario analysis indicated that Scenario4 was least preferred and Scenario5 was most preferred with the predicted probability of 0.24 and a willingness-

to-pay value of 10.6% over the current trip cost in all angler model. In light of predicted probabilities and WTP values, the difference between the most and least favored scenarios was not very substantial. However, each segmented angler group showed a notably different pattern of management preferences: For example, Scenario5 (predicted probability of 0.31 and WTP value of 28.6%) was most preferred and Scenario1 (predicted probability of 0.15) was least preferred by casual anglers; Scenario5 (predicted probability of 0.21 and WTP value of 7.0%) was most preferred and Scenario4 was (predicted probability of 0.18 and WTP value of -0.2%) least preferred by intermediate anglers; and Scenario1 (predicted probability of 0.29) was most preferred and Scenario4 (predicted probability of 0.13 and WTP value of -30.5%) was least preferred by advanced anglers. As would be expected, casual anglers were most supportive of the most generous harvest regulations, while advanced anglers were the most supportive of the most restrictive harvest regulations (i.e., status quo) in terms of expressed willingness to pay values and predicted probabilities.

TABLE 4

The Predicted Probabilities and WTP of Proposed Scenarios with Changes in Fishing Trip Expectations

					All Anglers		Casual		Intermediate		Advanced	
	BAG	MIN	MAX	RETAIN	Prob.	WTP(%)	Prob.	WTP(%)	Prob.	WTP(%)	Prob.	WTP(%)
S.1	3	20	28	2	0.179		0.145		0.180		***0.293***	
S.2	4	20	29	5	0.193	2.90	0.170	5.88	0.214	6.96	0.202	-14.17
S.3	4	19	29	5	0.215	7.11	0.203	12.79	0.214	6.96	0.202	-14.17
S.4	4	19	29	7	0.178	-0.23	0.174	6.82	0.179	-0.23	0.131	-30.50
S.5	5	18	30	7	***0.235***	***10.58***	***0.308***	***28.57***	***0.214***	***7.01***	0.172	-20.17

Note. Expectation attributes of AVERAGE, CATCH, and Trip cost was restricted to be the same at the anglers' current levels for the comparison purpose.
The levels of Interaction effects were also changed depending on those of main effects.
The parenthesis indicates the ranking of each scenario based on the probability chosen.

Discussion

Whereas previous studies of angler preferences have assumed a homogeneous angler group with the identical pattern of fishing preferences, this study used the specialization framework to measure within-group fishing preferences for management alternatives. Study results provided support for the proposition suggested by Bryan (1977) and stated by Ditton et al. (1992) that acceptance and support for the rules and procedures associated with fishing would depend on angler's specialization level. As high specialization anglers have more to lose from resource degradation, they are probably more perceptive of resource change and disturbance than low specialization anglers and, consequently, have a more ecological view of natural resources and the need for management. As a result, they should show greater appreciation of and support for resource management practices such as harvest regulations that seek to reduce adverse user impacts than less specialization recreationists (Bryan, 1977; Ditton et al., 1992; Fisher, 1997; Katz, 1981; Sutton & Ditton, 2001). Thus, more specialized anglers are more likely to prefer current harvest regulations and less willing to relax the rules and regulations to assure that the resources and the experiences they provide remain available. Less specialized anglers, on the other hand, were more likely to be interested in catching greater numbers of fish and to be willing to relax harvest regulations to acquire the benefits or satisfaction closely related to their activity-specific preferences.

Furthermore, the analyses provided evidence there are heterogeneous preferences based on the proposition that anglers place different importance on activity-specific vis-à-vis activity-general fishing motivations in terms of their level of

specialization. It could be generally considered management and expectation attributes included in the model more closely related to activity-specific experience preferences. While experience preferences (or perceived benefits) refer to why people participate in fishing activity, activity-specific experience preferences indicate the characteristics unique to fishing such as number and size of fish and setting in which they are caught (Fisher, 1997; Graefe, 1980). On the contrary, activity-general experience preferences include relaxation, experiencing natural surroundings and being outdoors, which are common to all outdoor recreation activities (Fisher, 1997). The significant difference of these explanatory powers among groups (from 0.14 for the advanced angler group to 0.23 for the casual angler group) showed that the inserted attributes better explained observed trip choices for low specialization anglers compared to high specialization anglers. In light of the fact that anglers' focus shifts from activity specific to activity general as level of specialization increases, high specialization anglers are more likely to attach high importance to more general fishing experiences beyond simple fishing-specific experiences (Ditton et al., 1992; Fisher, 1997). In other words, for high specialization anglers, attributes, which belong to the realm of activity-general experience preferences are probably more important than management and expectation attributes contained here in the models (i.e., activity-specific experience preferences) in making decisions to participate in fishing trips. Accordingly, the attributes, incorporated in the SPDCM estimation, had higher explanatory power with low specialization anglers than with high specialization anglers.

Managers can expect anglers in various groups with different preferences to react differently to management options under consideration. Despite the need for implementation and enforcement of uniform management restrictions, “a diverse management regime may increase public support for fisheries management and conservation, bringing a concomitant increase in regulatory compliance” (Fisher, 1997; p.8). Since management restrictions can impact the outcomes of fishing experiences, management options that promote resource conservation and sustainability are likely to be more supported by high specialization anglers as reflected by expressions of high economic value (i.e., WTP) for the status quo option than by low specialization anglers. These results can help fishery managers take angler diversity into account in management efforts and not disenfranchise certain angler segments by focusing on the “average” angler with measures of central tendency.

There are several other points worth noting. First, we used three rather than four segmented groups. There is nothing sacred about using four specialization groups as Bryan (1977) did; a case could be made for three or five. The three groups used here is consistent with previous study efforts (e.g., Hvenegaard, 2002; Martin, 1997; Scott et al., 2005). Although there is no way to know the true number of specialization groups, a more systematic approach for determining the number of specialization groups will help improve understandings of anglers diversity. For example, the statistical tests used in the latent class choice approach could be one means to help determine the appropriate number of segmented groups without imposing a priori determined number of segmented groups (Gupta & Chintagunta, 1994; Swait, 1994). Second, because of the

hypothetical nature of the stated preference choice method, concerns have been expressed about the external validity of the predictability (Blamey & Bennett, 2001; Hanley, Wright, & Adamowicz, 1998). Thus, as a relatively novel method, joint use of a revealed preference model and stated preference choice model would help take advantage of prediction validity (Adamowicz, Swait, Boxall, Louviere, & Williams, 1997; Louviere et al., 2000). Finally, this study was applied into the unique situation of an abundance of red drum fish stocks in Texas. In contrast with a scarcity situation, abundant stocks will likely yield different influences on angler opinions and preferences for regulation changes considering future conservation. Despite the lack of comparability in managerial circumstances (between the relaxation of management interventions and the strengthening them), anglers revealed their concern for conservation and over exploitation regardless of the abundance situations (e.g., Gillis & Ditton, 2002; Oh et al., 2005b).

In conclusion, this study confirms that a comprehensive understanding of disparate group preferences and tradeoffs is an essential part of implementing harvest restrictions and other management rules to both avoid overexploitation of fishery resources and maximize anglers' satisfaction with their fishing trips. A balanced management approach with attention to angler sub-group differences is essential.

CHAPTER III

UNDERSTANDING ANGLERS' CONSERVATION CONCERNS USING RECREATION SPECIALIZATION

Introduction

Since Dunlap and Heffernan (1975) first explored the proposition of whether involvement of outdoor recreation activities leads to increased environmental concerns and behaviors, numerous studies have examined the relationship (e.g., Pinhey & Grimes, 1979; Theodori et al., 1998; Van Liere & Noe, 1981). Except for a few (e.g., Jackson, 1986; Thapa & Graefe, 2003), empirical research has not provided definitive support for an association between outdoor recreation participation and pro-environmental attitudes and behaviors.

Although weak measurement of key variables and other methodological issues were deemed as reasons for inconsistencies in findings (Thapa & Graefe, 2003; Theodori et al., 1998), three main factors are commonly suggested. First, the conceptual framework of aggregate recreational activities classified simply as, for instance, appreciative and consumptive (Dunlap & Heffernan, 1975), may not be appropriate to understanding the heterogeneity of recreationists' conservation attitudes and behaviors (Tarrant & Green, 1999; Theodori et al., 1998). Despite evidence of steady societal change from consumer- to conservation-oriented (Jackson, 1986), Thapa (2000) and Theodori et al. (1998) indicated that such a simple classification fails to consider the various degrees of consumptiveness associated with various recreational activities. For

instance, notwithstanding that recreational fishing is almost always categorized as a consumptive activity, it is highly unlikely their pro-environmental attitudes and behaviors are the same as those participating in other consumptive activities such as hunting. For example, there is no alternative of catch and release.

Second, and perhaps more importantly, recreationists' diversity or within-group differences, especially socioeconomic or recreation specialization level differences, was often disregarded in empirical studies (Tarrant & Green, 1999; Thapa, 2000; Van Liere & Noe, 1981). Previous findings regarding the relationship between specialization and environmental concerns have found strong support for a relationship of increasing concern for resource conservation by specialization level (Katz, 1981; Kauffman, 1984; Mowen et al., 1996). The logic is that more specialized recreationists become more aware of their own resource disturbances and, subsequently, they are likely to have greater concern for reducing adverse user impacts on natural resources (Bryan, 1977; Ditton et al., 1992; Fisher, 1997). Accordingly, an examination based on an assumption that recreationists are a homogenous group may not adequately reflect the effects of within-group diversity in participation of recreational activities.

Third, although intended for investigating the association between recreational participation and environmental behaviors, maintenance of the same measurement level of specificity or generality for both attitudes and behaviors has been frequently overlooked (Fishbein & Ajzen, 1975; Scott & Willits, 1994; Wall, 1995). Thus, general attitudes toward the environment, as typically used, may not be compatible with particular behaviors because these attitudes do not predict the diverse aspects of

particular behaviors (Geisler, Martinson, & Wilkening, 1977). In this regard, it is recommended that "to find variation in environmental attitudes and to discover how attitudes are related to environmental problems, studies of attitudes needed to focus on public reactions to local and specific environmental issues" (Wall, 1995, p. 298).

It is beneficial to explore the relationships that help foster recreationists' conservation behaviors in light of a single recreation activity, fishing in this study, which has been typically considered a consumptive form of recreation. Assessment in the context of recreational fishing activity was chosen because it is presumably even more imperative in light of inconsistent findings of previous empirical research. Although previous studies (e.g., Jackson, 1986; Thapa & Graefe, 2003) have supported the hypothesis that anglers were less involved in pro-environmental orientations than other nonconsumptive activities, other studies (e.g., Pinhey & Grimes, 1979; Van Liere & Noe, 1981) provided only weak or no support for the hypothesis. Surprisingly, Theodori et al. (1998) found a higher association between fishing and pro-environmental behaviors than between other nonconsumptive activities (e.g., picnicking and mountain biking) and pro-environmental behaviors.

Another important element in the study is the inclusion of recreationists' diversity, resulting from within-group angler differences based on the extent to which they have been socialized into fishing (e.g., recreation specialization). Previous specialization studies indicated that recreationists are not a homogeneous group and sub-groups vary in terms of behavior, experience, skill and the importance of an activity (e.g., Bryan, 1977; Ditton et al., 1992; Scott & Shafer, 2001). Thus, an integration of

recreation specialization and conservation attitudes and behavior in an interconnected manner is useful for including other theory-based explanatory elements (i.e., experience preferences, consumptive orientation) explained by recreation specialization.

Recently, structural equation modeling (SEM) has been gaining the popularity as a means for understanding causal mechanisms in outdoor recreation and leisure studies (e.g., Kyle, Graefe, Manning, & Bacon, 2003; Williams, Vogt, & Vitterso, 1999). SEM allows researchers to examine a set of causal relationships with multiple independent and dependent variables or factors (Bollen, 1989; Tabachnick & Fidell, 2001). Thus, this approach is particularly well suited to this study because factors, typically regarded as standard dependent variables in previous recreation specialization studies, can be included as endogenous factors for testing the causal mechanisms of recreationists' development of conservation attitudes and behaviors. The objectives of this paper were to: (1) understand the conservation attitudes and behaviors of recreational anglers using multiple dimensional concepts; (2) investigate relationships of recreation specialization and motivations and attitudes that mediate conservation attitudes and behaviors in a multivariate manner; and, (3) explore causal connections between conservation or pro-environmental attitudes and conservation responsible behaviors.

Literature Analysis

This section is to provide theoretical perspectives for each concept incorporated in the model, which examines the formation process of conservation attitudes and behaviors. The review of literature is organized into the following sections: recreation

specialization, experience preferences (i.e., perceived benefits), consumptive orientation, and conservation attitudes and behaviors.

Recreation Specialization

Recreation specialization provides a useful framework for understanding anglers' attitudinal and behavioral differences in natural resources conservation. Bryan (1977) first proposed the concept of recreation specialization, which provides a means of identifying and segmenting anglers' within-group diversity in a single recreational activity. Bryan's inductive reasoning (1977) based on observing trout anglers in Wyoming helped him to define recreation specialization as "a continuum of behavior from the general to the particular reflected by equipment and skills used in the sport and activity setting preferences" (p.175).

Notwithstanding the theoretical and applied popularity of recreation specialization for the last 30 years, there has been little agreement as to definition and measurement. Disregarding definition issues here (see Ditton et al. (1992) and Scott and Shafer (2001) for more), early research efforts to assess recreation specialization were conducted using either behavioral (e.g., Dawson et al., 1992; Martin, 1997; Schreyer & Lime, 1984) or attitudinal variables (e.g., McIntyre, 1989; Shafer & Hammitt, 1995; Siegenthaler & Lam, 1992). Despite the advantages of using this approach in terms of its simplicity, this application does not reflect the multivariate nature of specialization in that a completely reliable univariate measure is not plausible (Fisher, 1997; Fedler, 2001). Thus, a number of studies shifted their understanding of specialization to using

both behavioral and attitudinal measures (e.g., Chipman & Helfrich, 1988; McFarland & Boxall, 1996; Salz et al., 2001).

Recently, the use of three dimensions of recreation specialization, namely, behavior, skill and knowledge and commitment as proposed by McIntyre and Pigram (1992), and Scott and Shafer (2001) appears to be widely supported. In general, as the behavioral dimension of specialization increase, so do the skill and knowledge and commitment dimensions (Manning, 1999). In this way, the specialization framework shows iterative circularity in mutually reinforcing each measure, "in that development in one enhances the likelihood of reciprocal increase in the other" (McIntyre & Pigram, 1992: p. 4).

As level of angler specialization increases along a continuum in fishing, there are focus shifts from fish consumption to resource conservation and more emphasis on the activity's nature and settings (Bryan, 1977; Ditton et al., 1992). As anglers become more socialized into fishing and more dependent (along a continuum of specialization) on particular resources for the types of fishing they pursue (Ditton et al., 1992), they likely become more perceptive of natural resource disturbances and loss than their low specialization counterparts. Consequently, high specialization anglers have a more comprehensive view of natural resources and the need for attentive management. The understanding and support of management restrictions as well as the assignment of a higher value to particular natural resources are also hypothesized as closely connected to recreationists' concerns for resource conservation. Previous studies have generally

revealed an increasing concern for resource conservation by increasing specialization level (e.g., Chipman & Helfrich, 1988; Hvenegaard, 2002; Virden & Schreyer, 1988).

Accordingly, it is expected that in an interconnected framework, level of recreation specialization has direct and indirect causal influences on intermediate concepts (i.e., experience preference, consumptive orientation) and conservation or pro-environmental concerns. These conservation concerns include ascribing high benefit valuation of natural resources and support for management regulations. Finally, recreation specialization positively affects conservation and pro-environmental behaviors such as support for natural resources management measures.

Activity Specific and Activity General Experience Preferences

Recreationists' experience preferences (i.e., motivations, perceived benefits or expected rewards) can best be understood in terms of the multiple satisfaction approach (Hendee, 1974). As Driver and Cooksey (1977) and Fedler and Ditton (1986) indicated, fishing participation involves many other dimensions besides catching fish such as attaining general experiences and escaping life's routine. Besides the diversity of benefits typically sought from fishing, most previous research indicated a low importance rating for catching and keeping fish vis-à-vis other benefits sought (Fedler & Ditton, 1994). While studies of wildlife-oriented activities (e.g., birdwatching) have often used the three principal motivational categories of affiliation, achievement, and appreciation as proposed by Decker et al. (1987), studies of recreational fishing have commonly implemented two sets of motivational elements after Graefe's study (1980)

(activity-specific and activity-general). However, since measures of achievement are highly comparable with activity-specific experience elements and affiliation and appreciation with activity-general experience measures, the aforementioned differences could be the result of their independent inductive conceptualization of terms.

The theory of recreation specialization suggests a focus shift from activity-specific experience preferences to activity-general experience preferences as level of specialization increases (Bryan, 1977; Ditton et al., 1992). In other words, high specialization anglers are more likely than low specialization anglers to attach high importance to more general fishing experiences while placing low importance on activity-specific experience preferences. Thus, previous studies have mostly focused on exploring the existence of the positive or negative relationship between the level of specialization and these motivation (i.e., experience preferences) measures (e.g., Ditton et al., 1992; Fisher, 1997; Hvenegaard, 2002; McFarlane, 1994).

However, this type of reasoning may be insufficient to capture the extent of an association between level of specialization and these two elements of experience preferences. In other words, high specialization anglers who attach more importance to activity-general experience preferences may not also attach low importance to activity-specific experience preferences. For example, as Finn and Loomis (2001) showed, the importance of catching fish (activity-specific) and non-catch motives (activity-general) are rather highly dependent on previous success in catching fish. Accordingly, it can be reasoned that by expanding the interactive relationships between recreation specialization and activity-specific and activity-general experience preferences and

between activity-specific and activity-general experience preferences, other complex causal effects can be further incorporated to explain conservation attitudes and behaviors.

Consumptive Orientation

Consumptive orientation is defined as "the degree to which an angler values the catch-related outcomes of the angling experience" (Sutton & Ditton, 2001, p.52). Anglers at different level of recreation specialization place different importance on catching and keeping fish. Due to the common nature of the two domains (i.e., consumptive orientation and activity-specific elements), consumptive orientation is not distinctly differentiated from *activity-specific element*. Some previous studies have used activity-specific items for purposes of segmentation for consumptive orientation (Fedler & Ditton, 1986; Aas & Kaltenborn, 1995).

Consumptive orientation towards catching fish, however, is viewed instead as an attitudinal rather than motivational domain (Graefe, 1980). Although angler motivations are understood as predictable outcomes of a fishing experience, attitudinal dimensions of consumptive orientation would likely include an angler's orientation towards fishery resources (Graefe, 1980). In addition, an angler's decision upon harvesting fish is also affected by various motivational factors as well as the angling catch rate of others, angling effort and social normative pressures (Fedler & Ditton, 1994; Finn & Loomis, 2001; Hunt, Haider, & Armstrong, 2002). As a result of this reasoning, it is logical that

consumptive orientation is an independent element partially explained by angler motivations.

Anglers who attach lower importance to activity-specific measures and higher importance to activity-general measures are likely to have more satisfying fishing experiences despite low catch rates (Ditton et al., 1992; Sutton, 2001). As anglers with a low consumptive orientation have positive attitudes toward conservation or pro-environmental attitudes or concerns, they are more likely to give high importance to conservation (or pro-environmental) behaviors such as catch-and-release (Sutton & Ditton, 2001).

Environmental Attitudes and Behaviors

The bivariate associations between recreation specialization and environmental concerns have been examined previously in various recreational activities (e.g., Dyck et al., 2003; Hvenegaard, 2002; Katz, 1981; Thapa, 2000). In a recreation specialization context, previous studies of environmental concerns have employed various dependent variables such as level of management support (Chipman & Helfrich, 1988; Fisher, 1997; Salz et al., 2001), environmental preferences focused on specific activity settings (Katz, 1981; Kauffman, 1984; Martin, 1997; Virden & Schreyer, 1988), and concern for the environment in general (Dyck et al., 2003; Mowen et al., 1996; Thapa, 2000). However, according to Ajzen and Fishbein (1980), Scott and Willits (1994), a lack of congruence or specificity in examining the relationships between attitudinal and behavioral measures can be a concern in studies of overall environmental concerns in a

single recreational activity. Congruence or specificity indicates that recreationists in an activity are more likely to be susceptible to environmental alterations where the activity is practiced (Tarrant & Green, 1999). Also, it has been suggested that associations were stronger between outdoor recreation activities and attitudes toward specific aspects of the environment necessary for participating in those activities rather than between outdoor recreation activities and attitudes toward more remote resources or general environmental issues (Dunlap & Heffernan, 1975; Jackson, 1986; Wall, 1995). Thus, it is more credible to focus on decoding recreationists' conservation attitudes and behaviors in specific environmental settings in the context of a particular recreational activity and according to their level of recreation specialization.

Except for a few studies (Hvenegaard, 2002; McFarlane & Boxall, 1996), which used a basic manner of economic terms (e.g., willingness to donate to conservation), the concept of economic benefits has not been used previously as an attitudinal measure. Willingness-To-Pay above trip costs (WTP) quantifies anglers' net benefits (or consumer surplus) derived from direct and indirect use values of current and future resource use by consuming non-tradable fishing services (Edwards, 1990; Huppert, 1983). Despite a dissenting view of WTP as a behavioral intention (e.g., Barro et al., 1996; Pouta & Reckola, 2001), WTP can nevertheless be an attitudinal variable that influences behavioral intention or predicts real behaviors (Kahneman et al., 1993). Furthermore, in modeling the causal chain towards conservation behaviors, WTP is affected by the indicators of personal norms and motivations as well as an awareness of the consequences (Widegren, 1998). Kauffman (1984) added that "strong and specific

economic interests of an affected group usually take precedence over solving an environmental problem" (p. 25). Collectively, economic implications as an attitudinal measurement should be evaluated to better understand the process of conservation attitudes (Dalton et al., 1998).

The ultimate goal of conservation attitude studies is to investigate the explanatory impacts of these attitudes on conservation behaviors. Several studies have found causal connections between attitudes and behaviors at a weak or modest level (e.g., Scott & Willits, 1994; Tarrant & Cordell, 1997; Theodori et al., 1998; Van Liere & Dunlap, 1981). Various reasons have been offered to explain why attitudes do not usually predict behaviors very well (Tarrant & Cordell, 1997; Tarrant & Green, 1999): (1) attitudinal and behavioral measures are often not made at the same level of specificity; (2) these two constructs are not appropriately measured; and, (3) the influence of external factors is not adequately taken into account. In order to resolve weaknesses (1) and (2), a compatible measurement of recreationists' conservation attitudes and behaviors is required. Also, a multifaceted process is required for the final weakness (3). Hines, Hungerford, and Tomera (1987) and Newhouse (1990) identified diverse variables associated with conservation behaviors. Accordingly, while attitudes are deemed as one of the most influential factors, other variables such as locus of control, personal responsibility, and knowledge should be contained. Because internal locus of control (i.e., individual's perception of a person's ability to create change through his or her own behavior) and personal responsibility (i.e., individual's feeling of duty or obligation) are closely related to other motivational and attitudinal constructs

such consumptive orientation, an integrated approach to capture other variables in the model of conservation behaviors was considered beneficial to incorporate these effects. An overall theoretical model based on the aforementioned concepts is presented in Figure 2.

This study is intended to be a step to a more comprehensive understanding of the dynamic nature of building conservation concerns and how various factors are manifested and intercorrelated in the model settings. Based on the theoretical frameworks described previously, it is hypothesized that (1) recreation specialization will facilitate activity-general and activity- specific experience preferences, and then contribute to fostering conservation attitudes; (2) there will be a significant association between activity-specific and activity-general experience preferences, which subsequently contribute to explaining consumptive orientation; and (3) there will be a significant association between recreationists' economic benefits and management support, which subsequently contribute to predicting conservation behaviors (Figure 2).

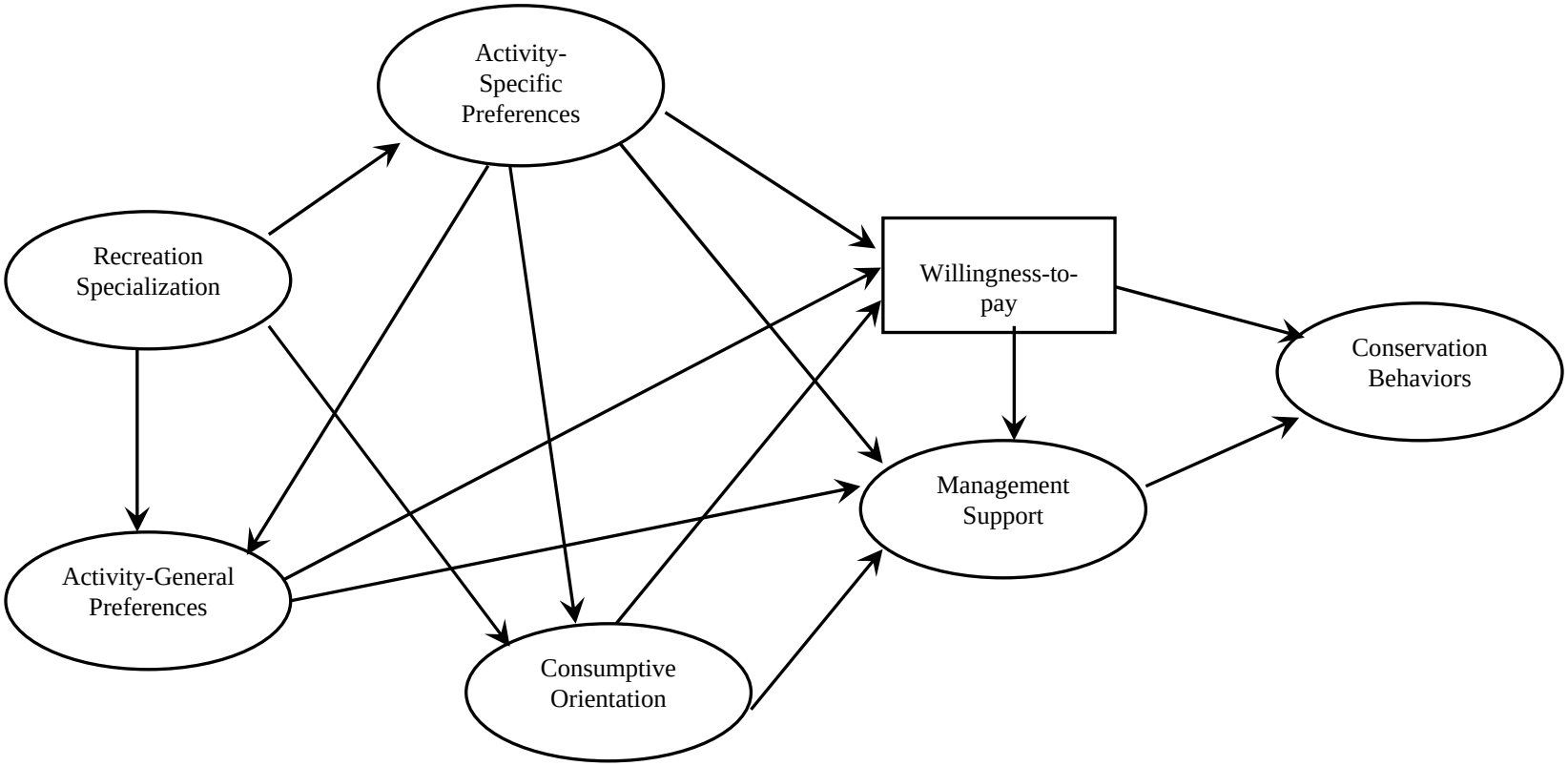


Figure 2. Hypothesized Relationships of the Proposed Model

Methods

Sampling

A two-step data collection approach was used to identify a group of anglers, namely, saltwater anglers in Texas. The initial survey involved the completion of a mail survey of licensed Texas anglers, who were selected from about 1,500,000 residents who purchased fishing licenses in the 1997 fiscal year (see Bohnsack and Ditton, 1999 for the complete survey). From the initial survey, 4,052 anglers responded for an effective response rate of 50.4%, of which 2,073 (51%) indicated they fished in saltwater at least once during the previous twelve months (Bohnsack & Ditton, 1999). Respondents were asked questions about broad categories of fishing participation, motivations (or experience preferences), attitudes towards fisheries management preferences, and expenditures.

A follow-up survey was sent to these 2,073 anglers during spring of 2000; both surveys made use of the survey method advocated by Salant and Dillman (1994). When 124 non-deliverables were deleted from consideration, the 1,102 usable returns resulted in an effective response rate of 57% (Anderson & Ditton, 2001). Topics in the second survey questionnaire included broad categories of questions on environmental concerns, attitudes toward fishery management practices, and participation in other outdoor recreation activities (see Anderson and Ditton, 2001 for the complete survey). Of the 1,102 respondents, 494 were deleted because of entire missing values in all sub-scales used in the model estimation. Accordingly, the final data set included 608 responses after inserting the mean value for other variables to secure sufficient sample size.

Data Analysis Procedures

The data in the study were analyzed with the Structural Equation Modeling (SEM) using SPSS (SPSS, 2001) and EQS (Bentler & Wu, 1995). Prior to using SEM to test the proposed model, Exploratory Factor Analysis (EFA) was conducted to reduce the number of variables in underlying constructs. The EFA was used to combine variables that were correlated to one another but independent of other subsets of variables into the underlying constructs (Tabachnick & Fidell, 2001). The EFA, using the latent root criterion of 1.0 and a factor loading of 0.4 for a factor inclusion by a varimax rotation was useful for determining the number of sub-constructs. As a result, the composite score of each construct with multiple items was calculated and treated as an indicator variable to measure latent factors such as specialization and consumptive orientation. This procedure can be beneficial for decreasing multicollinearity or error variance correlations among indicators; this is desirable in measurement model analysis (Bollen, 1989; Yoon & Uysal, 2005).

The next step was to test the overall structural equation model of the relationships among the latent factors. Using a two-step modeling approach is beneficial because a constructed measurement model shows the confirmation of acceptable fit to the data and provides a confirmatory assessment of validity (Anderson & Gerbing, 1988; Hatcher, 1994). The SEM process begins with the use of confirmatory factor analysis to evaluate and re-specify an acceptable measurement model (Hatcher, 1994). The Confirmatory Factor Analysis (CFA) of the measurement model specifies the posited links between the latent variables and their observed measures. Once the measurement

showed an acceptable fit, the structural model with the specification of causal relationships between the latent variables was tested (Byrne, 1994). The nomological validity of a theoretical model can be tested by performing a chi-squre difference test in which the theoretical model is compared to the measurement model. A finding of no signficant difference indicates the theoretical model is successful in accounting for the observed relationships between the latent constructs (Anderson & Gerbing, 1988).

The fit indices were selected primarily based on Hu and Bentler's (1998) recommendations, namely, to evaluate measurement models as well as structural models. These fit indices included Bentler's Comparative Fit Index [CFI], Bentler and Bonnett's Normed Fit Index [NFI], Joreskog-Sobrom Goodness of Fit Index [GFI] and Root Mean Square Error of Approximation [RMSEA]. While the indices of CFI, GFI and NFI range from 0 to 1.0, it is recommended that each value have at least .9 for an acceptable fit (particularly close to or over .95 for CFI) (Hu & Bentler, 1998; Kline, 1998). A RMSEA value of less than 0.08 indicates an acceptable model fit (close to .06 for a good fit) (Hu & Bentler, 1998; MacCullum, Browne, & Sugawara, 1996).

Variable Measurement

Specialization was measured using a three dimensional model suggested by McIntyre and Pigram (1992) and Scott and Shafer (2001): *behavior*, *skill and knowledge*, and *commitment*. Two items, total number of days fished in salt water in the last 12 months and total number of days fished in the last 12 months, were used for the behavioral dimension. To represent the skill and knowledge dimension, three items of

fishing skill level were used: Anglers were asked to compare their saltwater and general fishing ability to that of other anglers; and the level of skill constraint to fishing participation. Four items were used to measure the level of the commitment dimension based on the level of coping with the constraints to fishing participation: “my family or friends don’t want to fish with me more often”, “other leisure activities take up my time”, “it is difficult to find others to fish with”, and “my friends don’t fish much”.

For the directional consistency, these commitment items were reversely coded. The result of the CFA used to test theorized latent specialization process confirmed the three-dimensional approach and the Cronbach’s alpha reliabilities were computed at all above 0.60 (0.95 for the behavioral, 0.82 for the skill and knowledge, and 0.72 for the commitment dimension, see Table B1, APPENDIX B for the detailed results).

Experience preferences were operationalized using 18 scale items, which were developed originally by Driver and associates (e.g., Driver, 1977; Driver & Bassett, 1977; Driver & Knopf, 1976) to measure the importance of activity-general benefits in recreational pursuits. In addition, a number of items were added to measure activity-specific benefits, developed for angler research in Texas (Hunt & Ditton, 2001). Each used a 5-point Likert scale ranging from not at all important (1) to extremely important (5). The scale has four subscales: *interacting with fish* (e.g., “for the fun of catching fish”) and *achievement* (e.g., “to win a trophy fish”) for activity-specific benefits; *being in a natural environment* (e.g., “to be outdoors”) and *escaping individual stressors* (e.g., “for relaxation”) for activity-general benefits. The results of the EFA used to group

variables that were correlated indicated these four constructs and the scale reliabilities were all satisfactory with the range between 0.63 and 0.80 (Table B2, APPENDIX B).

Consumptive orientation was measured using a scale, which was modified by Ditton and Fedler (1984) and Fedler and Ditton (1986) from the original Graefe's scale (1980). Each item was measured on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). This scale was designed to measure four subscales of consumptive orientation: *catching something* (e.g., "if I thought I wouldn't catch any fish, I wouldn't go fishing"); *catching a trophy fish* (e.g., "the bigger the fish I catch, the better the fishing trip"); *keeping fish* (e.g., "I usually eat the fish I catch"); and, *number of fish caught* (e.g., "the more fish I catch, the happier I am"). The scale reliabilities between 0.68 and 0.76 were satisfactory, and the EFA confirmed these four sub-constructs (Table B3, APPENDIX B).

Management support was measured by asking respondents to indicate whether they support or oppose various management tools. The scale had 11 items, measured on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5), and delivered two different subscales of *catch-related regulations* (e.g., minimum size limit) and *general fishing regulations* (e.g., closed season) based on the EFA. The scale reliabilities were 0.79 and 0.80, respectively (Table B4, APPENDIX B).

Resource valuation was measured using a contingent valuation technique with the *closed-ended* (or referendum) format. Respondents were asked the following contingent valuation question: "If the prices of goods and services were to *increas**e***, causing this typical trip to cost $___ *more* than this trip (refer to the total cost of this

trip), would you cancel this trip?" For the economic valuation, 17 bid values ranging from $5 to $165 were randomly used to elicit a YES/ No response. This question measured WTP in excess of trip costs or consumer's surplus associated with the fishing experience. The logistical regression model was used to estimate WTP with four explanatory variables of income, gender, satisfaction level of fishing experience, and number of years fishing in saltwater. The estimated mean WTP value was $109 per trip (Table B5, APPENDIX B).

Conservation behaviors were measured by making inquiries about specific conservation-oriented behaviors in the context of recreational fishing. However, due to a concern that these self-reported behaviors might be biased and an inability to ask questions that might reveal lawbreaking and put the respondents in jeopardy, the scale items were asked regarding actions of their closest fishing companions or social circle; the goal was to use the behavior of their fishing companions as a proxy for their own behavior (Anderson & Ditton, 2000). The scale, measured on a 5-point Likert scale ranging from never (1) to always (5), had three subscales: *voluntary support* (e.g., "exceed their daily bag limits"); *abiding by the rules* (e.g., "they abide by TPW licensing requirements when fishing saltwater"); and *catch-and-release practice* (e.g., "they voluntarily practice catch and release"). For directional consistency, the voluntary support subscale was reversely coded. Scales reliabilities were 0.67, 0.53 and 0.48 for the three subscales, respectively (Table B6, APPENDIX B).

Subscale scores were computed by summing scores for individual items based on these results for the further SEM analysis. The summation was performed to reduce the

number of variables in each factor and, consequently, was included as indicators in the further analyses.

Results

The final data set for the SEM analysis included 608 anglers. Briefly, the average age of respondents was 44; 85% were male; the mean household income was between $60,000 and $69,999; and 85% were Anglos.

Structural Equation Model Analysis

A structural equation model was employed to investigate the causal relationships between recreation specialization, experience preferences, consumptive orientation, support for management rules and regulations, resource valuation, and conservation behavior. The relationship between the latent factors and the manifest indicator variables that measured those factors is depicted in the measurement model (Hatcher, 1996). Although the measurement models tested were not identical after inserting the certain unidirectional causal relationships between latent factors (Hatcher, 1996), the main principles are described as described in the Figure 3 on p. 62. Accordingly, since constructed measurement models did not show any causal relationships among latent variables, the free correlations, (i.e., two-headed arrows), between latent factors were allocated for the measurement models.

TABLE 5

Properties of the Final Measurement Model

Construct and Indicators	Standardized Loadings	*t-value*	Construct & Indicator Reliability
Specialization			0.52
Behavior	.44	8.27**	0.19
Skill / knowledge	.58	10.25**	0.34
Commitment	.53	9.26**	0.28
Activity-specific benefits			0.70
Interacting with fish	.74	18.58**	0.55
Achievement	.72	17.20**	0.52
Activity-general benefits			0.61
Being in a natural	.72	15.12**	0.52
environment	.61	13.32**	0.37
Escaping individual stressors			
Consumptive orientation			0.60
Catching something	.35	9.26**	0.12
Keeping fish	.71	9.92**	0.50
Catching a trophy fish	.64	10.65**	0.41
Number of fish caught	.37	9.63**	0.14
Management support			0.75
Catch-related regulations	.98	33.61**	0.96
General fishing regulations	.52	13.67**	0.27
Conservation behaviors			0.60
Voluntary support	.82	23.32**	0.67
Abiding the rules	.47	10.10**	0.22

** indicates the statistical significance at 0.001 level.

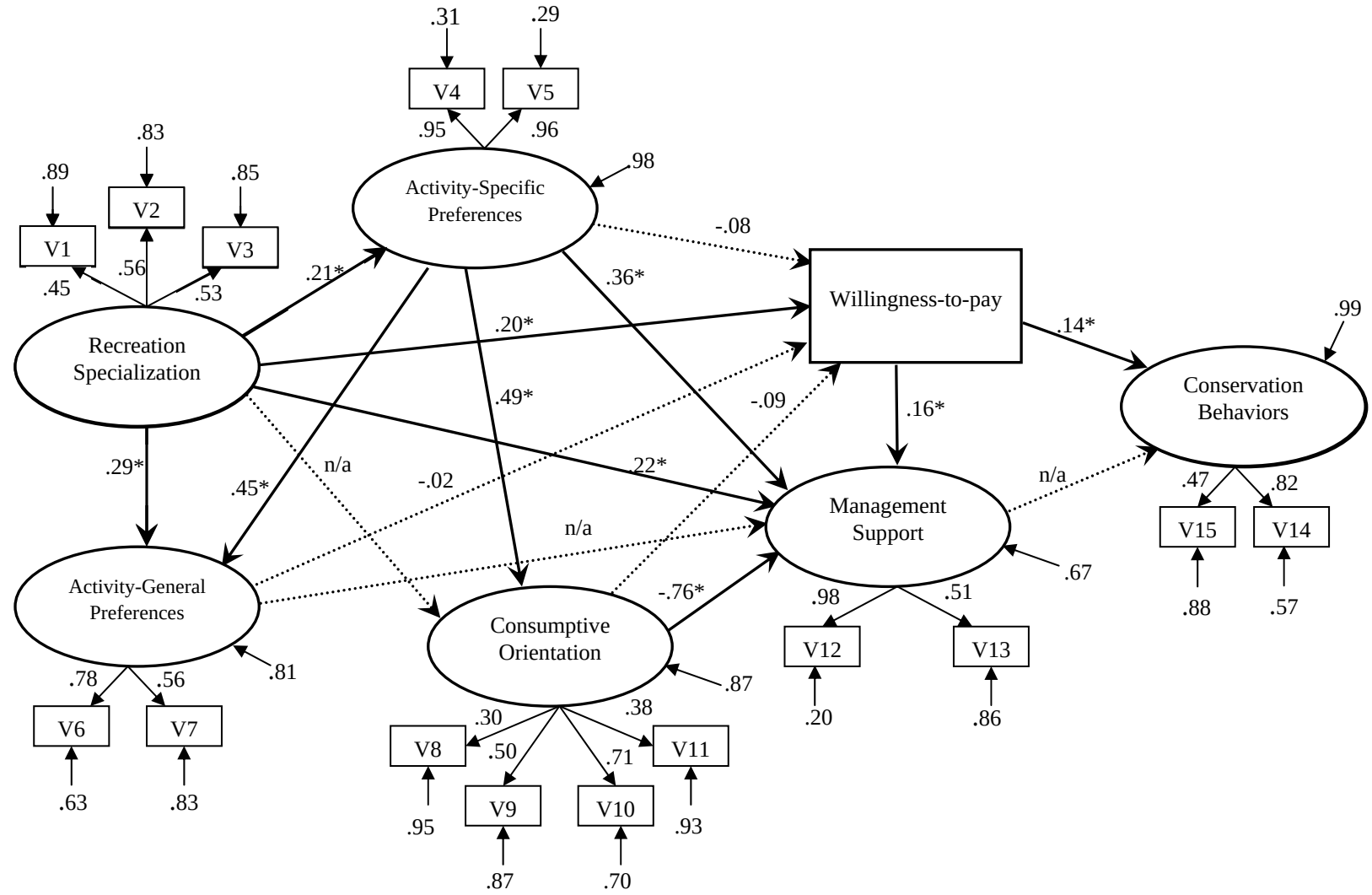
The initial measurement model was estimated using the maximum likelihood method. One indicator of *catch-and-release practice* was deleted due to a low coefficient

alpha below 0.30 (Joreskog, 1993) as well as a low scale reliability. As a result, a revised measurement model of seven latent factors with 14 indicators was derived for the CFA (Table 5). The fit indices of the measurement model indicated a good fit of the data (GFI = 0.96, CFI = 0.93, NFI = 0.89, RMSEA =0.05). Thus, the proposed model was tentatively accepted as the final measurment model. The highly significant *t* values for the coefficients ($p < .001$) provided evidence supporting the convergent validity of the indicators (Anderson & Gerbing, 1988). The construct reliabilities, comparable to Cronbach's alpha, which ranged from 0.52 to 0.75, were generally low but acceptable. In particular, the low internal consistency scores are not remarkable since non-scaled indicators were used (e.g., the specialization construct) or where indicators are generated from the transformation of individual items (i.e., summation of individual items in consumptive orientation) (Hatcher, 1996). Because the overall evaluation of this measurement model appeared satisfactory, the model was generally accepted as the study's "final" measurement model for moving on to specifying the proposed theorectical model.

An initial path model with causal relationships between latent factors was conducted against the postulated model in Figure 3. The overall fit of the model was good (GFI = 0.96, CFI = 0.92, NFI = 0.88, RMSEA = 0.05). To test the nomological validity of a theoretical model compared to the measurement model, a chi-squre difference test was performed. When the chi-square for the theoretical model was subtracted from the chi-square for the measurement model the resulting chi-square difference value was 24.2. The critical chi-square value with $df = 5$ at $p < 0.001$ is 20.5;

thus, this chi-square difference was significant**.** This finding showed that the theoretical model was unsucessful in accounting for the relationships between the latent variables and that this model did not provide an acceptable fit to the data.

For a specification search process of modifying models, it was less risky to drop insignificant parameters than to add new ones (Bentler & Chou, 1987). Consequenlty, the search began by identifying parameters that could be dropped from the model without significantly impairing the model's fit. Using a Wald test (Bentler, 1995) suggested that three paths be deleted, namely: from recreation specialization to consumptive orientation, from activity general preferences to to management support, and from management support to conservation behaviors. The revised model was re-estimated after deleting these and the overall goodness of fit indices for the model were acceptable, with values on the GFI, CFI and NFI in excess of or close to 0.9 and RMSEA below 0.06 (GFI = 0.96, CFI = 0.92, NFI = 0.88, RMSEA = 0.05). When the revised model did not provide a significantly worse fit to the initial theoretical model, the revised model was further compared to the measurement model. The chi-square difference was calculated as 26.0, which was less than a critical value of 26.1 (df = 8). The non-signifcant chi-square indicated that the causal relationships described in the revised model were succesful in accounting for the observed relationships between the latent constructs.



Dashed lines indicate paths that were not significant at 0.05.

Figure 3. Final Structural Model

Results of Latent Variables Regression

The standardized coefficents and *t*-values for each path are presented in Figure 4 based on the revised path model. In general, the results indicated relatively strong support for the positive effects of recreation specialization on environmental attitudes and, consequently, on conservation behaviors. As expected, recreation specialization had a strong positive influence on activity-general experience preferences (β = 0.29, t = 4.65). The positive coefficient (β = 0.21, t = 4.23, R^2 = 0.05) from specialization to activity-specific experience preferences, however, could not be expected from what was expected from theory. In light of the fact that activity-specific experience preferences positively influenced activity-general experience preferences (β = 0.47, t = 7.33), the previous positive relationship, however, was not totally unexpected. For the regression on activity-general experience preferences, the explanatory power of the model was relatively high (R^2 = 0.34). Consumptive orientation (R^2 = 0.24) was not affected directly by recreation specialization (β = -0.02, t = -0.27 from the original model) while positively affected by activity-specific experience preferences (β = 0.49, t = 5.49). When indirect effects were calculated by multiplying structural coefficients among latent variables that were mediated by at least one other variables, the indirect effects revealed that consumptive orientation was negatively influenced by recreation specialization through activity-specific experience preferences. As expected, when management support was the dependent variable, there was negative influence from consumptive orientation (β = -0.76, t = -4.66) as well as positive effects of recreation specialization (β = 0.22, t = 4.17), activity-specific experience preferences (β = 0.36, t = 4.30), and

resource valuation (β = 0.16, t = 3.38), on managemenet support (R^2 = 0.55). Furthermore, in contrast to the negative effects of activity-specific experience preferences (β = -0.08, t = -1.64), and consumptive orientation (β = -0.09, t = -1.57) despite its lack of significance at the 0.05 signficance level, only recreation specialization (β = 0.20, t = 3.11) was positively related in the regression to resource valuation (R^2 = 0.05). Finally, conservation behaviors were only positively influenced by resource valuation (β = 0.14, t = 2.79, R^2 = 0.02).

Discussion

The purpose of the study was to examine the integrated relationships for recreational anglers' environmental and conservation attitudes and behaviors, using the conceptual framework of recreation specialization. With well-grounded conceptual development and empirical support since its initiation, recreation specialization has provided an overall structure for including other accrued constructs, leading to an explanation of the effects on conservation attitudes and behaviors. Accordingly, experience preferences and consumptive orientation were integrated in an effort to extend the theoretical propositions in the causal manner. Previous studies have paid considerable attention to segmenting recreationists into managerially relevant groups by their level of specialization (e.g., Virden & Schreyer, 1988; McFarlane, 1996; Salz et al., 2001). Yet, there have been no previous studies, which investigate the integrated causal relationships with diverse constructs so as to explain the formation process of conservation attitudes and behaviors to the author's knowledge.

In contrast to previous studies that have used only indexed items of conservation attitudes (e.g., Dyck et al., 2003; Mowen et al., 1996), this study incorporated the concept of economic valuation by measuring WTP for a part of attitudes toward resource conservation. It is reasoned that high specialization anglers were more willing to pay to ensure that the resources and the experiences continue to remain available for their future use (Oh et al., 2005a; Sutton, 2001). Thus, higher WTP was understood as a higher level of conservation concern (Goulder & Kennedy, 1997; Titenberg, 2000). WTP measured by the contingent valuation method typically include a variety of values including use, nonuse, and option values. *Use value* measures the benefits from direct use of the environmental resources; *nonuse value* reflects the values people place on preserving resources that are not currently used; and, *option value* measures the deferred benefits from future use (Titenberg, 2000). Thus, with regards to conceptualization of conservation attitudes, it is reasoned that anglers who report higher WTP are more likely to support management-related regulations, *ceteris paribus* (i.e., with all other factors remaining the same).

Study results provided some tenable evidence that empirical analysis generally supported the theoretical propositions of the model. Recreation specialization had a positive influence on activity-specific and activity-general experience preferences. WTP was also positively affected by recreation specialization but negatively affected by activity-specific experience preferences and consumptive orientation despite their lack of significance at 0.05 level. In addition to the paths from activity-specific experience preferences and WTP, recreation specialization was significantly related to the

management support construct, while consumptive orientation was negatively significant. Finally, for the attitudinal and behavioral relationships, only WTP was positively related to conservation behaviors.

First of all, recreation specialization was a principal factor in explaining activity-specific and activity-general experience preferences. Typically, a simple uni-dimensional approach has been used to test for an association between recreation specialization and activity-specific experience preferences and between recreation specialization and activity-general experience preferences. However, the interactive relationships between these constructs in the analysis were overly simplified by disregarding factors such as the importance of catch-related motives (Finn & Loomis, 2001) or other situational variables such as catch rate and angling effort (Hunt et al., 2002; Sutton & Ditton, 2001). The result that activity-specific experience preferences were positively related to activity-general experience preferences would not have been found without the use of the multivariate approach.

Second, WTP was positively affected by recreation specialization and was significantly related to the management support construct. According to Oh et al. (2005a), anglers are likely to place a higher value on particular natural resources as they become more dependent on those resources (e.g., for the types of fishing they pursue) along the specialization continuum. Thus, when high specialization anglers report a higher WTP (or net benefits) than low specialization anglers, a higher proportion of the WTP value (assessed value for amenities derived from the fishing experience) will be allocated to resource conservation based on the reasonable assumption of a comparable

increase of each particular value making up total value. Likewise, high specialization anglers, who are likely more perceptive of resource disturbances associated with natural resource loss than low specialization anglers, report higher WTP, and, consequently, have a more holistic view of their physical surroundings as they relate to their activity (Oh et al., 2005a). Thus, it is reasoned that they should have a greater appreciation of and support for resource management practices that seek to reduce adverse user impacts than less specialized recreationists (Bryan, 1977; Ditton et al., 1992; Fisher, 1997; Sutton & Ditton, 2001).

Third, activity-specific experience preferences were negatively related to WTP (although significant at 0.1 level) but positively related to management support. Likewise, consumptive orientation was negatively related to management support. As predicted, high specialization anglers typically showed a low preference for a consumptive orientation and, alternately, reported a positive attitude toward conservation behaviors such as catch-and-release (Graefe, 1980; Sutton & Ditton, 2001). The finding of a negative association between activity-specific experience preferences and WTP and a positive association between activity-specific experience preferences and management support may look contradictory. However, this can be explained to some extent that management support measured by diverse fishing regulations were likely to be closely related to issues of specific environmental settings in fishing participation. In addition, WTP assessed by different components of use and nonuse values were likely to take account of more broad or general environmental issues. Accordingly, anglers who attach more importance to activity-specific experience preferences are likely more sensitive

towards specific setting changes by management regulations rather than by remote and general issues of resource conservation expressed in consumer surplus or net value terms.

Finally, WTP was positively related to conservation behaviors but management support was not significantly related to conservation behaviors. Based on congruence or specificity concerns when examining the relationships between attitudinal and behavioral measures (Jackson, 1986; Tarrant & Green, 1999; Wall, 1995), consistent measures were used in the context of recreation anglers and relevant fishing settings. If as Ajzen and Madden (1986) suggested in their theory of reasoned action, behavior is a function of attitudes and norms, then the association between attitudes and behaviors in the context of recreational fishing settings was only partially supported. In contrast to the well developed concept, application, and interpretation of WTP (i.e., based on nonmarket valuation studies) (Freeman, 2003), management support may not manifest itself well in a way here, and the scale used here possibly failed to incorporate diverse facets of conservation attitudes in a thorough manner. Future research is recommended to develop more valid and reliable scales to tap into the attitudinal measurement.

Study results have implications for resource management. By knowing the accurate multivariate nature of developing conservation attitudes and behaviors, managers can possibly gain a better predictive understanding of anglers' support for fishery management and conservation on issues. The tentative evidence that recreation specialization is a good causal indicator contributing to conservation attitudes and behaviors suggests that management regimes by specialization level may increase angler

support for fisheries management while at the same time providing them with quality fishing experiences (Chipman & Helfrich, 1988; Fisher, 1997; Salz et al., 2001). In addition, a slightly different finding was noted for the positive relationship between recreation specialization and activity-specific experience prferences. Although previous specialization studies (e.g., Bryan, 1977; Ditton et al., 1992) indicated a focus shift from activity-specific to activity-general preferences as level of specialization increases, study results presented here suggest that anglers' motivational propensity toward recreation fishing activity is a multifaceted function affected by situational variables (e.g., choice of location, species target), catch rates and angling effort, and previous catch success above and beyond the influence of recreation specialization (Finn & Loomis, 2001; Hunt et al., 2002; Sutton & Ditton, 2001). Unlike with activity-general experience preferences, managers can have a certain degree of control over activity-specific experience preferences (Fisher, 1997). Accordingly, diverse management practices that affect anglers' expected rewards can be developed to enhance the outcome of fishing experiences (Fisher, 1997). Additonally, WTP possibly provides a useful reference value of benefit measurement in policy decision-making. Because the monetized value of consumer surplus is useful for efficient resource allocation and distribution, WTP values can promote an understanding of the quantified benefits in support of the efficient management decision-making (Oh, et al., 2005b).

Several methodological limitations are worth noting. First, the analysis design used failed to capture insight to which particular specialization variables influence conservation attitudes and behaviors more than others. As Kuentzel and McDonald

(1992) pointed out, some aspects of specialization may have more impacts on outdoor recreation attitudes and behaviors than others.

Second, this study failed to consider the developmental aspects of recreation specialization (Scott & Shafer, 2001) as well as of the effects of recreation specialization on levels of conservation attitudes and behaviors because of the cross-sectional research design. Thus, when recreationists become more specialized in a given activity over time with consistent participation (Ditton et al., 1992), a longitudinal research design is needed to understand the effects of recreation specialization on sequential changes of recreationists' conservation attitudes and behaviors over time.

Third, we implied single directional causal relationships due to the ordering of variables in relationships. However, these single causal relationships were only supported by a data set used in the study and, thus were not conclusive (Bollen, 1989). Finally, study results were based on the results of a particular group of saltwater anglers and their fishing-specific attitudes and behaviors in Texas. Application of the model to other angler samples as well as with additional attitudinal and behavioral measures besides those used here will assist with the generalization of study findings.

In conclusion, recreation specialization and the other accrued concepts of motivations and attitudes appear to offer added insight to understanding the fostering process of conservation attitudes and behaviors within the single activity of recreational fishing. Further investigation of the interrelationships in the model will extend our understanding of recreational fishing as well as other recreation activities and efforts to

enhance conservation and sustainable use of the limited natural resources on which they depend.

CHAPTER IV

EFFECTS OF RACE AND ETHNICITY ON CONSERVATION CONCERNS

Introduction

Because of its consumptive use of fishery resources, recreational fishing has attracted more research interest and management attention to promote resource conservation than other non-consumptive recreational activities. Also, the growing recreational demands on fisheries resources resulting from increasing number of anglers and increasing frequency in fishing participation (Murdock et al., 1996; U.S. Fish and Wildlife Service, 2002) constantly provoke conservation concerns (Holland, Ditton, & Graefe, 1998; Quinn, 1996).

Resource scarcity typically requires allocation decisions based on efficiency, which promote resource consumption to the most highly valued use (i.e., social utility maximization) (Manfredo et al., 1996). Accordingly, fairness and equality have been relatively ignored under the shadow of social utility maximization. Unequal resource allocation resulting from different levels of fishing participation as measured by percentage of people who fish and of frequency of within (e.g., recreation specialization) and between (e.g., race and ethnicity) group diversity inevitably generate fairness and equality concerns (Kellert, 1984; Manfredo et al., 1996). Further, managing recreational resources is complex as a result of dichotomous resource use (Lee, 1993). Dichotomous resource use means that one use precludes another and there have been extensive

disagreements on how the costs and benefits should be estimated with future generations in mind.

Consequently, when the maintenance of enjoyable social relations rather than economic efficiency and productivity become more important as the management goals, appropriate reflection of fairness and equality should be also incorporated into the main principles of the management decision-making (Loomis & Ditton, 1993). Resource conservation and the subject of fairness and equality are interconnected because they are closely related to the society's stewardship responsibilities for intra-generational and inter-generational clienteles. An inter-generational approach is attached with future resource uses through well-maintained resource conservation; intra-generational concerns are resulted from the discrepancies of social class, age, gender, and race and ethnicity.

While it is almost infeasible to cope with these two (i.e., inter- and intra-generational) matters concurrently, this study focuses mainly on the latter separately. In particular, this study seeks to explore attitude and preference differences and their discrepancies in conservation attitudes so that we can account for racial and ethnic differences (as an inter-generational component). To provide more fair and equitable service delivery, managers need to enhance anglers' support for fishery management and resource conservation on a variety of issues by knowing the accurate multivariate nature of fostering conservation attitudes based on racial and ethnic diversity. The study intends not only to provide a more comprehensive understanding of the dynamic nature of building conservation concerns but to examine how the fostering process of conservation

attitudes toward and preferences for resource conservation differs by race and ethnicity. To attain these objectives, implementing a comparative research process is beneficial because it enable a researcher to investigate racial and ethnic differences in causal mechanisms to build conservation attitudes and preferences simultaneously.

With significant ongoing demographic changes in the U.S., an understanding of racial and ethnic differences in attitudes and behaviors involving natural resources becomes essential for successful fisheries management and conservation (e.g., Hunt & Ditton, 2001; Murdock et al., 1996; Toth & Brown, 1997). According to Baas et al. (1993), California was the first state without a majority of single racial and ethnic group, which comprises more than 50% of the state population. Likewise, in Texas, about 85% of the population increase is derived from growth in the minority population between 1990 and 2025 and, consequently, roughly one half of the state population will be comprised of minority groups by 2025 (Murdock et al., 1992).

This increase in diversity also has a substantial impact on recreational fishing mainly resulting from increased numbers and proportions of minority residents and increased immigration (Hunt & Ditton, 2002; Fedler et al., 1998; Murdock et al., 1996). Despite an overall declining rate of fishing participation, an increasing number of angler populations are mainly derived from minority groups, which indicates a low participation rate historically. This will require managers to better understand differences among groups with regard to perceived benefits of recreational fishing, importance on catching and keeping fish, conservation attitudes, preferences and behaviors of their heterogeneous constituency groups for sustainable resource use (Hunt & Ditton, 2001,

2002; Toth & Brown, 1997). Insufficient information of attitudinal, behavioral and preferential differences, resulting from diverse race and ethnicity, does not maximize the efficiency of management program planning and service delivery to the public (Hunt & Ditton, 2001; Hutchison, 1987; Toth & Brown, 1997; West, 1989).

To date, several studies have focused on identifying racial and ethnic differences in preferred recreational activities, social and environmental settings, management practices and conservational attitudes (e.g., Stamps & Stamps, 1985; Taylor, 1989; Washburne 1978; Woodard, 1988). However, in those studies (e.g., Baas et al., 1993; Hunt & Ditton, 2002; Pinhey & Grimes, 1979), conservation attitudes by group or race / ethnicity differences were simply tested as a standard dependent variable without the recognition of the influence of other mediating factors in a causal framework. Therefore, it is more constructive to explore an integrated understanding of racial and ethnic differences in conservation attitudes based on a causal manner with multiple explanatory factors. Additionally, previous studies primarily made use of general indexed items of conservation attitudes (e.g., *new environmental paradigm scale*) with a framework of aggregate recreational activities (e.g., Dunlap & Heffernan, 1975; Theodori et al., 1998; Van Liere & Noe, 1981). In contrast, this study made use of unique scaled items, which were designed for assessing recreationists' conservation attitudes in specific environmental settings and related to a particular recreational activity (i.e., fishing). It is reasoned that associations would be stronger between involvement in an outdoor recreation activity and conservation attitudes toward specific parts of the environment

necessary for participating in that particular activity (Fishbein & Ajzen 1975; Scott & Willits, 1994; Wall, 1995).

Except for a few studies (Hvenegaard, 2002; McFarlane & Boxall, 1996), which used a basic manner of economic terms (e.g., willingness to donate to conservation), the concept of economic benefits has not been used previously as an attitudinal measure in recreation literature. Accordingly, this study also added economic valuation terms by measuring willingness-to-pay above trip costs (WTP) for resource conservation to reflect more general and broad conservation issues of conservation attitudes (Dalton et al., 1998). Studies of nonmarket valuation quantify anglers' net benefits (or consumer's surplus) derived from direct and indirect values of current and future resource use by consuming non-tradable fishing services (Edwards, 1990; Huppert, 1983). Kauffman (1984) added that "strong and specific economic interests of an affected group usually take precedence over solving an environmental problem" (p.25). Despite a dissenting view of WTP as a behavioral intention (e.g., Barro et al., 1996; Pouta & Reckola, 2001), WTP can also be regarded as an attitudinal variable that influences behavioral intention or predicts real behaviors (Kahneman et al., 1993). Additionally, in terms of the maintenance of congruence or specificity, WTP is a good determinant of behavior, well-suited to be attitude specificity for a good correspondence of activity-specific attitude to behavior in terms of a single recreational activity (Barro et al., 1996; Fishbein & Ajzen, 1975; Pouta & Pekola, 2001).

Race and Ethnicity

Numerous studies have shown perceptible behavioral and attitudinal differences in ethnic groups' recreational participation and preferences (e.g., Baas et al., 1993; Hutchinson, 1988; Stamps & Stamps, 1985; Washburne, 1978). It is widely known that minority groups of African-Americans and Hispanic-Americans are more likely to use group- or family-oriented urban recreational facilities and Anglo-Americans are more likely to participate in individualistic outdoor recreation activities (Hutchison, 1987; Meeker, Woods, & Lucas, 1973; West, 1989). According to Toth and Brown (1997), Anglo-Americans more likely fish for generic fishing experiences while Hispanic- and African-Americans view fishing more as an economic means for consumption. Consequently, as a less important leisure activity, minority groups showed consistently lower participation rates in recreational fishing (Fedler et al., 1998; Waddington, 1995; Pullis, 2000). For example, using 2001 national survey data, only 7% participation rates were reported for recreation fishing for African-Americans and Hispanic-Americans, respectively despite 18% participation rate for Anglo-Americans (U.S. Fish & Wildlife Service, 2002). As a result, 93% of the anglers were Anglo-Americans and 5% were African-Americans or Hispanic Americans, respectively (U.S. Fish & Wildlife Service, 2002).

To explain minority under-participation in outdoor recreation, four different theoretical perspectives have been proposed: marginality, ethnicity (or subculture), assimilation, and discrimination (Floyd, 1998). Whereas assimilation is useful to explain intra-ethnic group differences (Floyd & Gramann, 1993; Shaull & Gramann, 1998),

historical discrimination and segregation has been reflected mainly in social patterns of marginality and subcultural differences (Hunt, 2000; West, 1989). As a result, the first two conventional theories (i.e., marginality and ethnicity) have been used extensively to explain participation differences. Briefly, marginality theory posits that poverty and limited access to socioeconomic resources contribute to minority groups' under-representation; ethnicity theory stresses racial and ethnic subcultural differences in norms, values and expectations (Allison, 1988; Hutchinson, 1987; Washburne, 1978).

Yet, empirical findings in numerous studies (e.g., Bowker & Leeworthy, 1998; Carr & Williams, 1993; West, 1989) have not supported either theory overwhelmingly. And, it can be reasoned that the two theoretical perspectives have been related to each other to explain disparate recreational attitudes and behaviors (Allison, 1988). However, since anglers in this study were licensed, they have already negotiated various social and economic constraints and, had the benefit of some level of socialization in fishing. Accordingly, it can be reasoned that the marginality perspective was minimized in this study. In addition, by controlling the effects of various socio-economic variables, the role of subcultural theory can be more likely evaluated as a result of direct comparison of recreationists of similar socioeconomic status. Because it has been commonly used and provided a viable explanation based on subcultural theory to measure heterogeneity of recreation behavior across diverse racial and ethnic groups (Allison, 1988; Manning, 1999), the method of matching samples was also used in this study.

Anglers' reasons for recreational fishing differ by diverse racial and ethnic groups. According to Hunt and Ditton (2002), significant racial and ethnic differences

between Hispanic-Americans and Anglo-Americans were reported on three of the four constructs related to the perceived benefits of fishing activity (e.g., escaping individual stressors, being in a natural environment). To explain the differences, Campbell (1989) identified the heterogeneous relationships between different cultural backgrounds and fishing styles. He explained that whereas Anglo anglers with high social status view fishing to experience nature from a naturalistic perspective, minority groups with lower social status participate in the activity for product-driven reasons such as fish consumption.

Different preferences for pursing particular perceived benefits from a recreation activity are also derived from diverse cultural patterns toward leisure and environmental orientation (Hunt, 2000; Simcox, 1993). Whereas activity, rationality and efficiency-oriented western culture places more importance on individual accomplishment and personal needs through recreational activities, the passive or negative cultural connotations toward nature from non-western cultures place more values on societal group and family cohesiveness and belonging (Hunt & Ditton, 2002; Simcox, 1993). Consequently, the minority groups' collectivistic orientation to "being" rather than "doing" emphasizes greater focuses on catching fish as well as family and group affiliations during fishing participation (Campbell, 1989; Hunt & Ditton, 2001; Simcox, 1993; West et al., 1992). Different level of fish consumption and perceptions of preferred natural settings also contribute to the diversity of conservation attitudes (Baas et al., 1993). Taylor (1989) and Hunt and Ditton (2002) found that minority groups were less involved in environmental groups perhaps because of their primary concerns for

basic economic needs and socially relevant environmental justice in their communities. Thus, heterogeneous ethnic and racial fishing involvement, perceived benefits, and perceptions of natural resources also produce different environmental attitudes, level of support for management measures, knowledge and awareness (Baas et al., 1993; Noe & Snow, 1990; Taylor, 1989).

Recreation Specialization

To construct a causal framework to explain conservation attitudes toward and preferences for natural resources, recreation specialization can provide a well-developed theoretical framework. Recreation specialization is generally defined as a continuum of behavior reflecting differences in recreational development and socialization and provides a means of identifying angler group diversity in a recreational activity (Bryan, 1977; Ditton et al., 1992).

Since initiation by Bryan (1977), the measurement of recreation specialization as well as its definition has been unresolved for understanding the diversity of participants in any given activity (Ditton et al., 1992; McIntyre & Pigram, 1992; Scott & Shafer, 2001). Disregarding a full discussion of its controversial aspects (for readers who are interested, see Ditton et al., 1992 and Scott & Shafer, 2001), early studies in recreation specialization were conducted based on either a behavioral (e.g., Schreyer & Lime, 1984; Schreyer et al., 1984; Dawson et al., 1992; Choi et al., 1994; Martin, 1997) or an attitudinal focus (e.g., McIntyre, 1989; Siegenthaler & Lam, 1992; Shafer & Hammitt, 1995). However, because this univariate application does not completely reflect the

multivariate nature of specialization (Fisher; 1997; Scott & Shafer, 2001), recent studies have emphasized a shift into both behavioral and attitudinal measurement (e.g., Chipman & Helfrich, 1988; McFarland & Boxall, 1996; Fisher, 1997; Salz et al., 2001). Accordingly, a three-dimensional application with behavior (behavioral), skill and knowledge (cognitive) and commitment (psychological) proposed by McIntyre and Pigram (1992) and Scott and Shafer (2001) has been gaining its popularity in the recent studies (e.g., McFarlane, 1996; Lee & Scott, 2004; Scott & Thigpen, 2003).

As level of specialization increases along a continuum, the activity-general elements of the fishing experience (e.g., relaxation and being outdoors) increase in importance compared to the activity-specific elements (e.g., unique to fishing) (Ditton et al., 1992; Fisher, 1997). Because recreationists seek diverse benefits or rewards by participating in an activity from a multiple satisfaction approach (Hendee, 1974), high specialization anglers also attach more importance to activity general elements besides directly catching fish. Furthermore, as high specialization anglers become more familiar with on-site resource conditions, they are more able to perceive resource disturbances (Bryan, 1977; Ditton et al., 1992; Sutton & Ditton, 2001). Therefore, it is expected they will have greater voluntary appreciation and support for the conservation of natural resources and express greater understanding and support of resource management practices to reduce adverse user impacts on natural resource (Aas & Kaltenborn, 1995; Chipman & Helfrich 1988; Fisher, 1997; Quinn, 1992; Salz et al., 2001; Sutton & Ditton, 2001). Also, they are likely to place higher values on particular natural resources

resulting from the loss of the natural resources that underlie their outdoor recreation activities (Dalton et al., 1998; Sutton et al., 2001; Oh et al., 2005a).

The concept of recreation specialization is also useful for explaining the racial and ethnic heterogeneity of recreational participation and environmental setting preferences (Ditton, 1996; Hunt & Ditton, 2002). Previous studies have identified racial and ethnic differences in preferred recreational activities, social and environmental settings, management practices and conservation attitudes (e.g., Stamps & Stamps, 1985; Taylor, 1989; Washburne, 1978; Woodard, 1988). According to Ditton (2004) and Hunt and Ditton (2002), minorities, with historically lower rates of recreational participation and their relatively recent socialization into fishing, are more likely to be in specialization groups toward the lower end of the specialization continuum. Thus, we would expect that heterogeneous level of recreation specialization by race and ethnicity also produces differences in environmental attitudes, levels of support for conservation, and environmental knowledge and awareness (Baas et al., 1993; Noe & Snow, 1990; Taylor, 1989).

Thus, an integration of the recreation specialization concept with racial and ethnic diversity should provide a useful framework for incorporating the diverse effects of other explanatory elements derived from recreation specialization. By combining recreation specialization and other mediating concepts of consumptive orientation and perceived benefits (i.e., motivational factors), study objectives were: (1) to understand environmental attitudes with multiple concepts of overall support for management regulations and resource benefits valuation, (2) to investigate relationships of recreation

specialization and other motivations and attitudes that mediate conservation attitudes in a multivariate manner, and (3) to identify how the attitudinal and preferential developmental process toward resource conservation differs by race and ethnicity in recreational fishing context.

Methods

Sampling

A mail survey was conducted with 10,000 Texas anglers, who were selected from about 1,500,000 licensed anglers in 1998. A stratified random sampling design was used to assure sufficient numbers of saltwater anglers: 49% of the anglers sampled lived in Texas coastal counties. Using the mail survey procedures recommended by Salant and Dillman (1994), 4,052 anglers responded for an effective response rate of 50.4%; of which 2,073 (51%) indicated they had fished in saltwater at least once during the previous twelve months (Bohnsack & Ditton, 1999). Anglers were asked to answer whether they were “White”, “Black”, “Asian or Pacific Islander”, “American Indian”, or “Other” and then whether they were “of Spanish/Hispanic origin” (see Bohnsack and Ditton, 1999 for the complete survey). Because of the limited sample size in other racial and ethnic groups, only Anglo and Hispanic angler groups were used for the analyses: 1,189 of Anglo anglers and 219 of Hispanic anglers were identified initially. To secure sufficient sample size, the mean value was imputed for each variable after deleting all missing values in each scale and variables used in the model estimation. This procedure further required the deletion of nine Hispanic anglers. Further, two different groups were

matched based on income, age, and residency location to control for the effects of these variables (Hunt & Ditton, 2001; Washburne, 1978). Thus, individual Hispanic and randomly drawn Anglo anglers in the same (or similar if there was not one available) zip code, income level (low = $1 to $29,999; mid = $30,000 to $69,999; high = $70,000 and above), and age group (10 year categories) were matched. The procedure used here was similar to other studies (e.g., Cheek, Field, & Burdge, 1976; Hunt, & Ditton, 2001; Washburn, 1978). Finally, 210 cases were kept in each group.

Measures

Recreation Specialization - A three dimensional approach suggested by McIntyre and Pigram (1992) and Scott and Shafer (2001) was used: *behavior*, *skill and knowledge*, and *commitment*. These dimensional concepts are latent factors since each dimension is a hypothetical construct that is not directly measured or observed (Hatcher, 1994). The behavioral dimension included two items, total number of days fished in salt water in the last 12 months and total number of days fished in the last 12 months. Three items of self-evaluated general fishing skill level, and the comparison of saltwater fishing ability to that of other anglers, and the level of skill constraint to fishing participation were used for the skill and knowledge dimension. To represent the commitment dimension, three items were used to measure the level of commitment based on the importance of fishing activity and level of coping with constraints to fishing participation: “my family or friends don’t want to fish with me more often”, “other leisure activities take up my time”, “it is difficult to find others to fish with”, and “my friends don’t fish much”. The

result of the Confirmatory Factor Analysis (CFA) confirmed the theorized latent specialization model and the Cronbach's alpha for the reliabilities for Anglo and Hispanic anglers were computed as 0.88 and 0.93 for the behavioral, 0.59 and 0.63 for the skill and knowledge, and 0.70 and 0.69 for the commitment dimension, respectively (Table C1, APPENDIX C).

Experience preferences - Experience preferences were operationalized using 18 scale items to measure the importance of activity-general and activity-specific benefits in recreational pursuits (Driver, 1977; Hunt & Ditton, 2001). Using a 5-point Likert scale ranging from not at all important (1) to extremely important (5), the scale intended to measure four indicators: *interacting with fish* (e.g., "for the fun of catching fish") and *achievement* (e.g., "to win a trophy fish") for activity-specific benefits and *being in a natural environment* (e.g., "to be outdoors") and *escaping individual stressors* (e.g., "for relaxation") for activity-general benefits. The results of the Exploratory Factor Analysis (EFA) to group variables that were correlated indicated the scale reliabilities for these four constructs were all satisfactory with a range between 0.63 and 0.76 for Anglo and between 0.63 and 0.83 for Hispanic anglers (Table C2, APPENDIX C).

Consumptive orientation – A series of 17 items, originally developed by Graefe (1980) and later modified by Ditton and Fedler (1984) were used to measure consumptive orientation. Each item was measured on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). This scale was designed to measure four subscales of consumptive orientation: *catching something* (e.g., "if I thought I wouldn't catch any fish, I wouldn't go fishing"); *catching a trophy fish* (e.g., "the bigger the fish I catch, the

better the fishing trip"); *keeping fish* (e.g., "I usually eat the fish I catch"); and *number of fish caught* (e.g., "the more fish I catch, the happier I am"). After deleting four items in each group because of low factor loadings below 0.4, an EFA confirmed these four sub-constructs and the scale reliabilities between 0.63 and 0.74 for Angler anglers and between 0.61 and 0.72 for Hispanic anglers were satisfactory (Table C3, APPENDIX C).

Management support - Management support was measured by asking respondents to indicate whether they support or oppose a number of proposed or currently used management tools. The scale has 11 items, measured on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5), and delivered two different subscales of *catch-related regulations* (e.g., minimum size limit) and *general fishing regulations* (e.g., closed season) based on the EFA. The scale reliabilities were 0.83 and 0.82 for Anglo anglers and 0.83 and 0.76 for Hispanic anglers (Table C4, APPENDIX C).

Willingness to pay - Resource valuation was measured using a contingent valuation technique with the *closed-ended* (or referendum) format. Respondents were asked the following contingent valuation question: "If the prices of goods and services were to *increase*, causing this typical trip to cost $___ *more* than this trip (refer to the total cost of this trip), would you cancel this trip?" 17 bid values ranging from $5 to $165 were randomly used to elicit a YES/ No response. This question measured willingness to pay (WTP) in excess of trip costs or consumer's surplus associated with the fishing experience. A logistical regression model was used to estimate WTP values with four explanatory variables: income, the number of trip days, satisfaction level of fishing experience, and total trip cost. Surprisingly, the estimated mean WTP value were $93

per trip for Anglos and $114 per trip for Hispanics (Table C5, APPENDIX C). Subscale scores besides resource valuation were computed by summing scores for individual items based on these results for the further Structural Equation Modeling (SEM) analysis. An overall theoretical model derived from the aforementioned concepts is presented in Figure 4. Based on the theoretical frameworks described above, the model was constructed based on the following hypotheses for both groups: (1) recreation specialization will facilitate activity-general and activity- specific experience preferences, and then contribute to fostering conservation attitudes; (2) there will be a significant association between activity-specific and activity-general experience preferences, which subsequently contribute to explaining consumptive orientation; and (3) there will be a significant association between recreationists' economic benefits and management support, which consist of conservation attitudes and preferences (Figure 4).

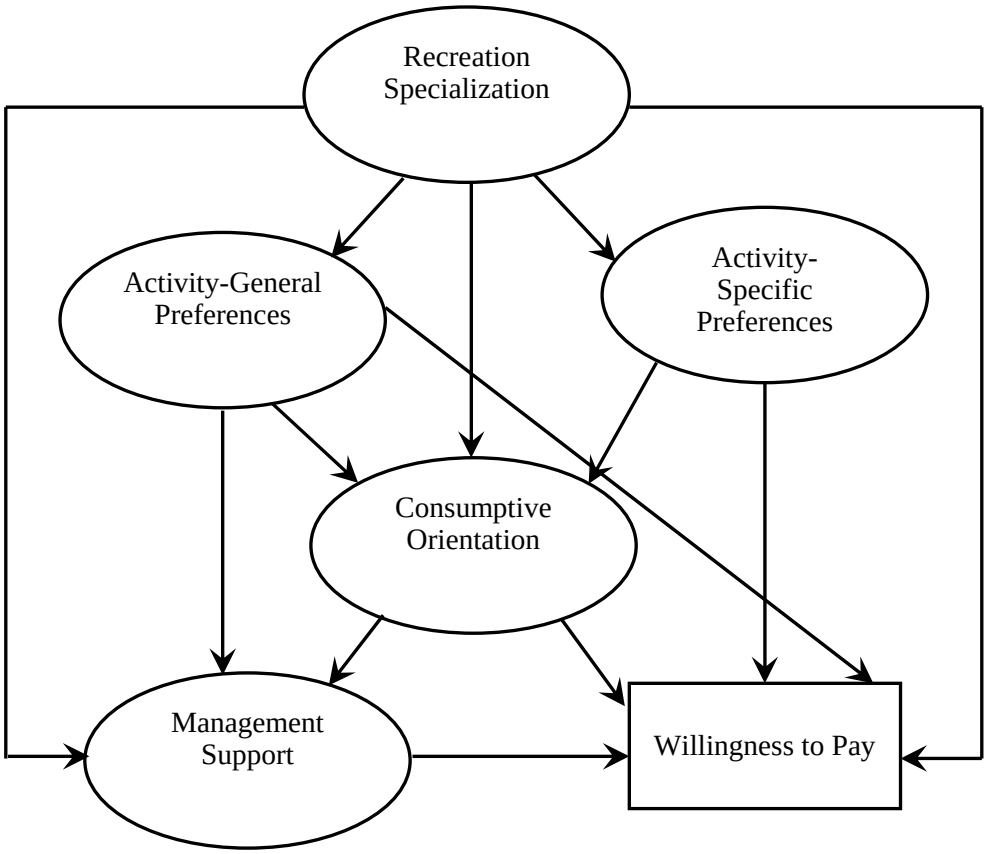


Figure 4. Hypothesized Relationships of the Proposed Model

Results

The descriptive statistics of the two groups before and after matching samples are presented in Table 6. Compared to Hispanic anglers, Anglo anglers were slightly older, had higher household incomes, and included a greater number of females before controlling for three variables (zip code, income level and age group). Surprisingly, Hispanic anglers seemed to be more avid with more importance given to fishing activity compared to other recreation activities and a greater number of fishing days over the past 12 months. This was unexpected because lower participation rates and fewer years of

experience in recreational fishing were commonly assumed for minority groups (Hunt, 2000; Hunt & Ditton, 2001).

TABLE 6

Descriptive Statistics of Hispanic and Anglo Anglers

	Before Matching		After Matching	
Variables	Hispanic	Anglo	Hispanic	Anglo
Age (years)	38.6	42.3	38.8	39.2
Income (coded 1 to 11: 1 = Under $10,000, 11 = $100,000 and above)	5.0	6.9	4.9	5.3
Gender (% of male)	89.0	82.2	89.0	77.1
Ability (1 = less skilled, 2 = equally skilled, 3 = more skilled)	1.9	1.8	1.9	1.8
Importance (code 1 to 4: 1 = only one of many outdoor activities, 4 = your most important outdoor activity)	3.1	2.8	3.1	2.7
Totdaysw (Total number of saltwater fishing days in the last 12 months)	23.9	18.4	24.3	18.5

Slight differences between Hispanic and Anglo anglers occurred due to use of the original categories.

Model Results

To test the effects of multi-group invariance, several steps of questioning were required (Bollen, 1989; Byrne, 1994). The first step was that a two-group unconstrained model operated equivalently across Hispanic and Anglo anglers as all parameters in the two groups were allocated to vary. The hypothesis was whether the proposed model in Figure 5 was identical with the same underlying structures for the two groups. One indicator (*catching a trophy fish*) of consumptive orientation was deleted due to a low

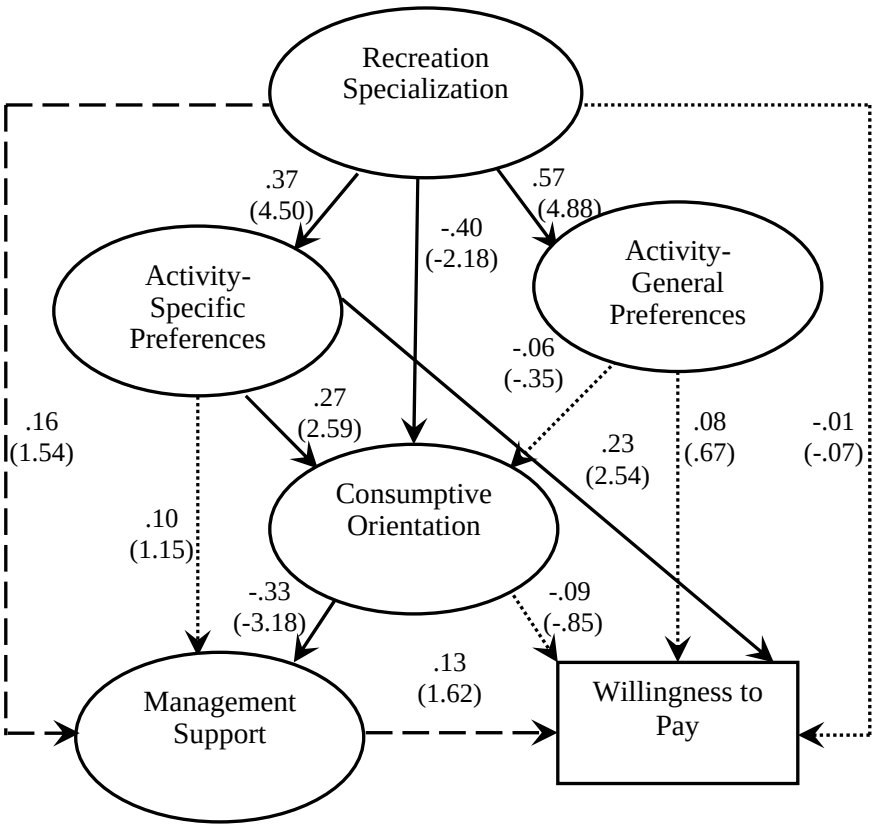
factor loading score (below 0.3) for Hispanic anglers. Accordingly, this indicator was also deleted in Anglo anglers to maintain measurement equivalence. This model provided a good fit of the data (χ^2 (100 *df*) = 187.4, GFI = 0.94, CFI = 0.92, RMSEA =0.05)

The next hierarchical step was to test for invariance by constraining the factor loadings to be equal. Based on the preliminary results of Lagrange multiplier tests on the equality constraints on the same factor loadings as well as a large deterioration in fit, a specified constraint (*general fishing regulations* for management support) was released to be freely estimated. Thus, given the remaining equality constraints across two groups, the fit of the model provided a slightly poorer fit (χ^2 (107 *df*) = 198.6, GFI = 0.93, CFI = 0.91, RMSEA =0.05). Given that the fit indices from the initial two-group unconstrained model served as the comparison point, however, the (partial) equivalence was confirmed based on a non-significant chi-square difference ($\Delta\chi^2$ = 11.2, *df* = 7). Holding the matrix of factor loadings invariant, the hypothesis test of equality constraints in all regression coefficients across the groups was performed. A substantial increase in the chi-square difference ($\Delta\chi^2$ = 50.6, *df* = 13) indicated that the restrictions of invariant regression coefficients were not acceptable. Therefore, while parameters in all other matrices were allowed to vary, factor loadings were only constrained to be invariant in the final model. A series of statistical tests indicated that the Anglos and Hispanics were likely to share comparable underlying structures, but were extensively different regarding the causal relationships among latent variables (i.e., directionality or size of the regression coefficients).

Results of the Model

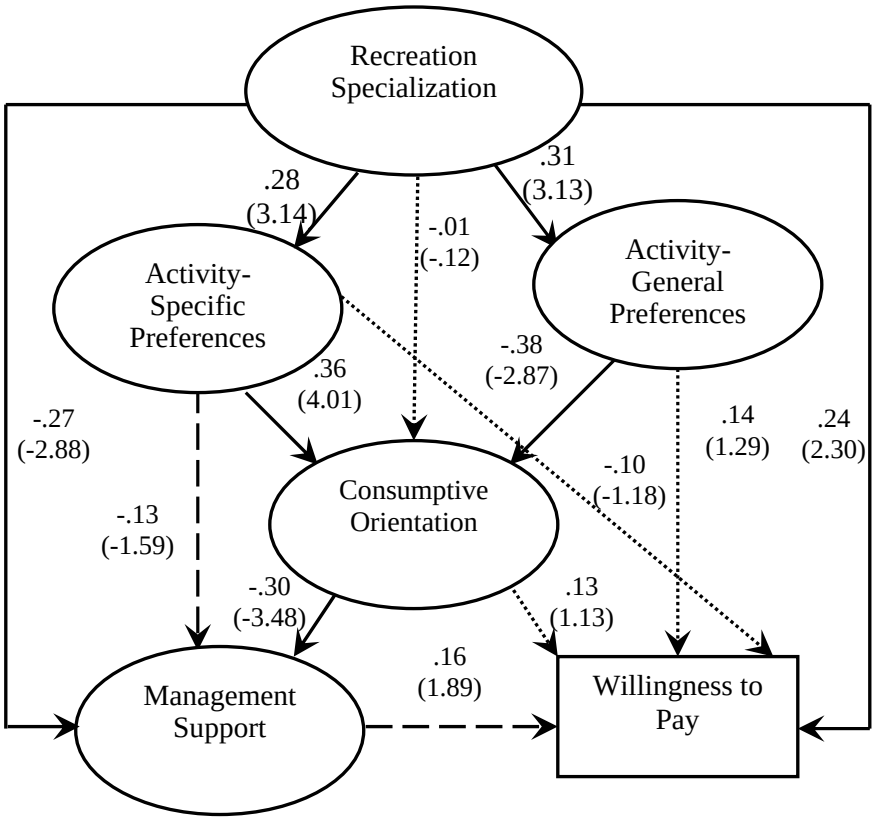
The results of the standardized parameter estimates and *t*-values for Hispanic and Anglo anglers are presented in Figures 5 and 6. All coefficients had *a priori* expected signs except for Anglo anglers for the effect of recreation specialization on management support. Thus, the one-tailed tests and 0.05 and 0.10 significance levels were appropriate and were used because significance tests conducted with small samples were less powerful (Bollen, 1989; Kline, 1998). As expected, the results indicated relatively strong support for the positive effects of recreation specialization on activity-specific (β = 0.37, t = 4.50 for Hispanics and β = 0.28, t = 3.14 for Anglos) and on activity-general experience preferences (β = 0.57, t = 4.88 for Hispanics and β = 0.31, t = 3.13 for Anglos). Also, consumptive orientation were positively affected by activity-specific preferences (β = 0.27, t = 2.59 for Hispanics and β = 0.36, t = 4.01 for Anglos) and management support was negatively influenced by consumptive orientation (β = -0.33, t = -3.18 for Hispanics and β = -0.30, t = -3.48 for Anglos). Despite their significance at 0.1 level, management support had a strong postive effect on WTP (β = 0.13, t = 1.62 for Hispanics and β = 0.16, t = 1.89 for Anglos) as expected. However, it should be noted that Hispanic and Anglo anglers showed significantly different patterns on conservation attitudes from other causal factors. For Hispanic anglers, recreation specialization had a negative effect on consumptive orientation (β = -0.40, t = -2.18). And, activity-specific experience preferences (β = 0.23, t = 3.13) had a strong positive effect on WTP. These two coefficients were not signficant for Anglo anglers. On the

other hand, for Anglo anlgers, there was a significantly positve effect (β = 0.24, *t* = 2.30) of recreation specialization on WTP and consumptive orientation was negatively influenced by activity-general preferences (β = -0.38, *t* = -2.87). In constrast to the positive effect of recreation specialization on management support which was significant at 0.1 level (β = 0.16, *t* = 1.54) for Hispanic anglers, the negative coefficient (β = -0.27, *t* = -2.88) for Anglos was opposite to what was expected from theory.



Straight lines indicate paths that were significant at 0.05.
Long dashed lines indicate paths that were significant at 0.1.
t-value in parenthesis

Figure 5. Structural Model Analysis (Hispanic Anglers)



Straight lines indicate paths that were significant at 0.05.
Long dashed lines indicate paths that were significant at 0.1.
t-value in parenthesis.

Figure 6. Structural Model Analysis (Anglo Anglers)

In the structural equation model analysis, it was useful to decompose the total effects into direct and indirect efects on the basis of its intercorrelated relationships. According to Bollen (1989), indirect and total effects can provide additional insights not detectable in the examination of direct effects only. This enables us to to assess whether these secondary effects strengthen or moderate structural aasociations between latent variables. While the direct effects of latent variables were shown in Figures 5 and 6,

indirect effects were attained by multiplying structural coefficients among latent variables that were mediated by at least one other variables. Total effects were obtained by adding direct and indirect effects. From the estimated effects shown in Table 7, several points can be made. Although the direct structural path from recreation specialization to consumptive orientation was not significant, the indirect effects revealed that consumptive orientation was negatively influenced by recreation specialization in Anglo anglers. However, for Hispanic anglers, the strong negative relationship in the direct effect was slightly moderated by consideration of the indirect effects in consideration of the same direct and indirect pathes. A similar pattern was found in the causal relationship between recreation specialization and WTP for Hispanics. Despite no direct effect between these constructs, recreation specialization via other latent variables positively contributed to overall WTP. Additionally, in consideration of indirect effects, activity-general experience preferences had a positive influence on level of management support and WTP for Anglo anglers.

TABLE 7

Direct, Indirect and Total Effects of Proposed Latent Variables

For Hispanic Anglers													
	AS		AG		CO			MS			WTP		
	Direct	Total	Direct	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
RS	0.37	0.37	0.57	0.57	-0.40	0.10	-0.30	0.16	0.10	0.26	-	0.12	0.12
AS					0.27		0.27	-	-0.09	-0.09	0.23	-0.01	0.22
AG					-		-		-	-	-	-	-
CO								-0.33		-0.33	-	-0.04	-0.04
MS											0.13		0.13
For Anglo Anglers													
	AS		AG		CO			MS			WTP		
	Direct	Total	Direct	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
RS	0.28	0.28	0.31	0.31	-	-0.02	-0.02	-0.27	0.01	-0.26	0.24	-0.04	0.20
AS					0.36		0.36	-0.13	-0.11	-0.24	-	-0.04	-0.04
AG					-0.38		-0.38		0.11	0.11	-	0.02	0.02
CO								-0.30		-0.30	-	-0.05	-0.05
MS											0.16		0.16

RS – Recreation Specialization, AS – Activity-Specific Preferences, AG – Activity-General Preferences, CO – Consumptive Orientation, MS- Management Support, WTP – Willingness-To-Pay

Discussion

In general, study results indicated strong support for the proposed model that recreation specialization and other latent factors provided a good understanding of conservation attitudes of both Hispanic and Anglo anglers. In most previous studies of recreation specialization, experience preferences (i.e., perceived benefits or motivations) and consumptive orientation were considered standard dependent variables explained by recreation specialization. A structural equation approach was beneficial with the inclusion of mediating variables to gain additional insights into "how these incorporated variables in a constructed causal framework are interrelated and how differently they contribute to fostering conservation attitudes." In addition, although previous studies (e.g., Dunlap & Heffernan, 1975; Van Liere & Dunlap, 1981) used mainly a multi-item scale such as the *new environmental paradigm scale* to measure conservation attitudes, Wall (1995) emphasized that "to find variation in environmental attitudes and to discover how attitudes are related to environmental problems, studies of attitudes needed to focus on public reactions to local and specific environmental issues" (p. 298). Thus, to maintain the same measurement level of specificity for attitudes and improve predictability of diverse behavioral aspects in a single activity (Fishbein & Ajzen, 1975; Geisler, Martinson, & Wilkening, 1977; Scott & Willits, 1994; Wall, 1995), scaled items specifically designed for management support in recreational fishing were used. This study also captured the economic benefit concept measured by WTP. WTP, which quantifies anglers' net benefits (or consumer surplus) derived from the consumption of fishing services (Edwards, 1990; Huppert, 1983), is a good attitudinal variable that

influences behavioral intention or predicts real behaviors (Kahneman et al., 1993; Kerr & Cullen, 1995; Widegren, 1998).

The goal of the paper was not to decide which theoretical perspective of marginality or ethnicity is superior when accounting for anglers' conservation attitudes and preferences but to explore attitudinal differences in conservation attitudes using specialization and other accrued concepts by racial and ethnic groups. While several differences were also identified, it was surprising that Hispanic anglers generally showed the similar patterns of fostering conservation attitudes. It can be tentatively concluded that all anglers regardless of their racial and ethnic origins were likely to show the similar patterns of fostering attitudes toward and preferences for resource conservation. Although the research design used here did not allow further identifying the reasons for this, a credible explanation is that after a certain level of development in socialization, Hispanic anglers become similarly socialized to reach comparable levels of recreation specialization as Anglo anglers. As anglers invest more time and economic resources in fishing, they are behaviorally more bound to fishing and express a higher degree of affective attachment (Buchanan, 1985).

The use of licensed anglers indicates that anglers managed various social and economic constraints. And then, they likely participate in fishing activity on a continual basis particularly after purchasing a license. As a result, heterogeneous development in conservation attitudes and preferences are likely to be minimal and be better explained by recreation specialization rather than conventional theories such as marginality and ethnicity. Study results provided tenable evidence for both groups, that empirical

analysis generally supported the theoretical propositions of the model proposed in previous recreation specialization literature (Bryan, 1977; Ditton et al., 1992). High specialization anglers regardless of their origins are more likely to support management regulations and express a higher WTP. The following discussion points are worth considering.

First, recreation specialization was a strong explanatory factor with regard to activity-specific preferences and activity-general preferences for both Hispanics and Anglos. Although previous specialization studies (e.g., Bryan, 1977; Ditton et al., 1992; Salz et al., 2001) indicated a focus shift from activity-specific to activity-general preferences as level of specialization increases, this does not mean that high specialization anglers who attach more importance to activity-general elements attach low importance to activity-specific preferences. Instead, based on study results, this should be interpreted that high specialization anglers place comparatively more importance on the overall fishing experience than low specialization anglers. The path coefficients derived from causal relationships between recreation specialization and activity-specific preferences and between recreation specialization and activity-general preferences confirmed this proposition for both groups, especially with the relationships stronger for Hispanics.

Second, the different relationships between activity-general experience preferences and consumptive orientation were notable although the positive impact of activity-specific preferences on consumptive orientation was significant in both groups. In contrast to the negative impact of activity-general experience preferences on

consumptive orientation for Anglo-Americans, this causal relationship was not found for Hispanics. As high specialization Anglo anglers place more importance on being in a natural environment, they were likely to place less importance on consumptive orientation as shown previously by Sutton & Ditton (2001). However, the non-significance of the relationship for Hispanic-Americans could be partially explained because of their relatively greater emphasis on catching, keeping or consuming fish represented as consumptive orientation (Hunt & Ditton, 2001; Lynch, 1993).

Third, although a combined positive association between recreation specialization and WTP was confirmed for both groups, the negative impact of recreation specialization on level of management support for Anglos was surprising. Contrary to a positive association between these two constructs in Hispanics, this relationship in Anglos was opposite. A couple of factors may explain this unexpected finding. First, it may have resulted from a strong negative correlation between recreation specialization and an indicator of support for management regulation (i.e., *general fishing regulations*) which consisted of items such as the level of support for a closed season, closed fishing area, bait restrictions. Thus, high specialization Anglo anglers were more likely to support other proposed management regulations (e.g., minimum, maximum size limit, etc.) but strongly oppose (or not support) management measures such as prohibited fishing areas or restrictions on bait use. Nevertheless, this preference pattern was not found in Hispanic anglers. Another reason for the finding above could be the significantly greater number of female anglers (23%) included in Anglo group compared to 11% in Hispanic group. Previous research has not been clear whether or not

female recreationists (including anglers) were equally supportive of pro-environmental issues and concerns as male recreationists (e.g., Stern, Dietz & Kalof, 1993; Teal & Loomis, 2000). But, perhaps because the former group overall has been disproportionately located toward the lower end of the recreation specialization continuum (e.g., Bohnsack, 2002), a simple analysis based on a homogeneous group may not have reflected fully the latent characteristics of heterogeneous (between male and female anglers) opinions, attitudes and concerns.

Finally, as noted, matched samples were used to control the effects of socio-economic variables. Although Hispanic anglers had fewer economic resources, as indicated in this study (before matching), matching samples using three variables were beneficial to remove the marginality perspective but only partially so. Thus, it can be reasoned that any different patterns found here between Hispanics and Anglos were more likely the result of subcultural diversity. However, because of sample limitations as well as the limited extent of other socio-economic variables (e.g., education, marriage, etc.) available to investigate this issue, the influence of other variables from the marginality perspective still remained. Accordingly, future research will be required to provide more definitive evidence as to which particular perspective influenced the structural patterns that lead to conservation attitudes and behaviors more than others.

There are several future research needs worth noting in this area. First, there was an inadequate sample size for other race and ethnic groups preventing further group comparisons. Because random sampling did not provide a sufficient number of samples for other groups of interest, other approaches (e.g., stratified sampling) need to be used

to over-sample other groups to extend the generalizations provided here. Second, the research design used failed to provide insight as to which particular specialization variables influenced conservation attitudes and behaviors more than others. As Kuentzel & and McDonald (1992) pointed out, some sub-dimensions of specialization may have more impacts on fostering recreation attitudes and behaviors than others. Third, actual behavioral measures were not included in the analysis. Although the theory of reasoned action proposes that behavior is a function of attitudes and norms (Ajzen & Madden, 1986), inconsistent findings between attitude and behaviors were frequently reported (e.g., Scott & Willits, 1994; Tarrant & Cordell, 1997; Theodori et al., 1998; Van Liere & Dunlap, 1981). Because the ultimate goal of environmental attitude studies was to investigate the explanatory impacts of these attitudes on conservation behaviors, future study with the inclusion of conservation behaviors are needed.

In conclusion, the use of recreation specialization with intermediate variables enabled a better understanding of racial and ethnic differences. Future development and investigation of the causal relationships in the proposed model for diverse racial and ethnic groups as well as other population groups including other recreational activities will extend our understanding and efforts to encourage conservation and sustainable use of natural resources.

CHAPTER V

SUMMARY AND CONCLUSIONS

The goal of the dissertation was to provide a better understanding of recreationists' conservation attitudes and behaviors. In the following section, I will synthesize limitations of previous literature that focused on environmental and conservation attitudes and review the benefits of using the conceptual framework of recreation specialization.

Since Dunlap and Heffernan's (1975) initial study to explore the positive relationship between participation in outdoor recreation and increasing conservation and environmental concerns, numerous studies (e.g., Jackson, 1986; Pinhey & Grimes, 1979; Van Liere & Noe, 1981) have examined the relationship using a classification typology, which typically categorized recreational activities into several major segments (e.g., consumptive and appreciative activities). Nevertheless, empirical research except for a few studies (e.g., Jackson, 1986; Thapa & Graefe, 2003), has not provided any definitive support for this proposition.

One of the main reasons for this is that probably such a simple classification fails to consider the various degrees of resource consumption associated with recreational activities and, consequently, the diversity of participation within an activity has been disregarded (Fedler, 2001; Thapa, 2000; Theodori et al., 1998; Van Liere & Noe, 1981). In other words, examinations were based on an assumption that recreationists are a homogenous group. This may not adequately reflects the effects of within-group

diversity in participation of recreational activities, resulting from socioeconomic or recreation specialization level differences (Katz, 1981; Tarrant & Green, 1999; Van Liere & Noe, 1981). For example, the degree of consumption and emphasis on the nature and settings associated with an activity may vary, resting on the attitudes and behaviors of recreationists and, thus, different individuals may attach different meanings within the same activity (Theodori et al., 1998; Van Liere & Noe, 1981).

To better understand the existing fostering process of conservation attitudes and preferences, Van Liere and Noe (1981) noted

> "Rather than abandon research on environmental attitudes and outdoor recreation, we suggest that research focus on specifying more complex models linking these two variables. What needs to be identified are those influences which might cause individuals to interpret their outdoor experiences in a manner that creates awareness and concern about the environment and causes them to manifest that concern in their actual behavior" (p.511).

A number of variables in a single recreational activity (i.e., fishing) to reflect diversity issues, have been suggested to reflect diversity issues such as organization membership (Gigliotti & Payton, 1993), place of residency to fishing location (Dalton et al., 1998), and species preference (Wilde & Ditton, 1994). Nevertheless, recreation specialization provides a well-developed framework for understanding anglers' attitudinal and behavioral differences in a discussion about natural resources conservation.

Recreation specialization, generally defined as a continuum of behavior reflecting differences in recreational development and socialization, provides insights to supporting conservation and environmental stewardship attitudes and behaviors (Bryan, 1977; Ditton et al., 1992; Fedler, 2001). As more participation and investment of time and monetary resources in an activity convert into a higher level of personal and behavioral commitment, increasing dependency on specific resources and settings are likely reported. Accordingly, high specialization recreationists show increasing perceptions to resource disturbances and degradations (Bryan, 1977; Ditton et al., 1992; Fedler, 2001; Hvenegaard, 2002). They are also more likely to show greater voluntary appreciation and support for conservation of natural resources and express more understanding of and support for resource management practices toward reducing the adverse user impacts on natural resource (Chipman & Helfrich 1988; Fisher, 1997; Hvenegaard, 2002; McFarlane & Boxall, 1996). They are likely to place higher values or costs on particular natural resources resulting from the loss of the natural resources that underlie their outdoor recreation activities (Oh et al., 2005a).

An overall theoretical sequence of causal relationships to depict a fostering process of conservation attitudes and behaviors is presented in Figure 3. Although feedback effects were ignored in the model because of a methodological limitation in structural equation modeling, the main point in the formulation was that recreation specialization directly and indirectly contributes to fostering conservation attitudes and behaviors through other intermediate motivational and attitudinal variables (e.g., experience preferences, consumptive orientation).

Therefore, using the recreation specialization framework, the main objectives of the dissertation were to: 1) explore the comprehensive understanding of anglers' trade-offs, opinions, and preferences for various management options; 2) investigate the connected effects of how recreational anglers drive their conservation attitudes and preferences toward natural resources; and, 3) identify differences of attitudinal and preferential heterogeneity resulting from between-group diversity (i.e., race and ethnicity). Since overall results supported the proposed hypotheses and propositions, this chapter sought to provide a summary and synthesis of the findings of the three independent studies, agenda for future research on conservation and environmental attitudes and behaviors, and the management implications of the results.

Summary of Study 1: Angler Preferences for Management Harvest Regulations

Although constraints on anglers' harvest behavior and resource uses have become a common goal of management efforts, there has been little understanding of angler diversity in preferences for various management restrictions. In particular, a typical research design such as public opinion measurement (Smith, 1983) does not yield comprehensive insight into the relative importance of each harvest restriction and the tradeoffs anglers are willing to make when viewing regulatory options jointly. Additionally, previous studies using a stated preference choice method (e.g., Aas et al., 2000; Gillis & Ditton, 2001; Hicks, 2002; Oh et al., 2005b) did not reflect that recreationists are not a homogeneous group and that sub-groups vary in terms of behavior, experience, skill and the importance of an activity (e.g., Bryan 1977; Ditton et

al., 1992). Since there has been no research to examine anglers' holistic preferences for trade-offs of various rules and regulations using the recreation specialization framework, Chapter II of this dissertation was devoted to testing anglers' heterogeneous opinions and preferences for management harvest restrictions using recreation specialization segmentation. The data set included the total responses of 522 anglers, who targeted red drum with a first, second, and third choice preference. Anglers were divided into three groups using a three dimensional model of specialization. From conditional logit estimations of four different preference models including a pooled model (i.e., all angler model), it was found that increases in bag limit and maximum size as well as catch probability lead to considerable increases in the choice of one fishing trip over another. Likewise, anglers preferred a lower minimum size and favored the current two fish over 28" maximum size per year regulation over other options presented. Each specified model of a heterogeneous specialization segment, however, showed different patterns of significant variables. While most variables were statistically significant with the same expected signs, distinctions were noticed. For example, minimum size limit, maximum size limit, average fish size, and expected catch probability were not significant for advanced anglers while maximum size limit were not significant for casual anglers and ASC and MINIMUM for intermediate anglers. Coupled with the results of the scenario analyses, overall, advanced anglers were less interested in relaxing current red drum regulations, while casual anglers showed a strong preference for catching more red drum by relaxing regulations.

Study results generally supported the proposition suggested by Bryan (1977) and Ditton et al. (1992) that as anglers become more participated in fishing activity, anglers place more emphasis on fishery conservation than on fish consumption and their preferences for resource characteristics become more clearly apparent over time. Thus, to continue the enjoyable resource nature and settings, high specialization anglers show greater appreciation of and support for resource management practices such as harvest regulations than low specialization recreationists (Bryan, 1977; Ditton et al., 1992; Fisher, 1997; Katz, 1981). Thus, more specialized anglers were more likely to prefer current harvest regulations and be less willing to relax the rules and regulations to assure that the resources and the experiences they provide remain available. In contrast, less specialized anglers were likely more interested in catching more fish by relaxing harvest regulations. Analysis of various scenarios further helped support the findings and optimize the selection of the best combination of regulation attributes.

Summary of Study 2: Anglers' Conservation Concerns

Although managers can gain a better understanding of anglers' support for fishery management measures and conservation by understanding how their conservation attitudes and behaviors have formed, there has not been much work done in this area. To begin with, previous research has not provided definitive support for a relationship between conservation attitudes and conservation behaviors based on the aggregation typology of recreational activities. Because of little previous work on conservation attitudes and behaviors in the context of a single recreation activity (Fedler,

2001; Theodori et al. 1998; Thapa & Graefe, 2003; Van Liere & Noe, 1981), Chapter III sought to investigate the formation process of recreation specialization and other motivational and attitudinal variables that mediate conservation attitudes and behaviors.

Structural equation modeling was used to examine a set of causal relationships with multiple independent and dependent variables or factors (Bollen, 1989; Tabachnick & Fidell, 2001). A three dimensional approach measured with behavior, skill and knowledge, and commitment was used to measure recreation specialization. Experience preferences for fishing were divided into two sub-dimensions of activity-specific and activity-general benefits (i.e., experience preferences). Activity-specific benefits were measured with "interacting with fish" and "achievement" and activity-general with "being in a natural environment" and "escaping individual stressors." Consumptive orientation was measured using four subscales of "catching something ", "catching a trophy fish", "keeping fish", and "number of fish caught." Management policy support was measured using "catch-related regulations" and "general fishing regulations." Also, while the concept of economic benefits has been overlooked previously as an attitudinal measure, resource nonmarket valuation was measured using a contingent valuation technique with the *closed-ended* (or referendum) format. Finally, to investigate the explanatory impacts of these attitudes on conservation behaviors, conservation behaviors were measured by an indication of the extent to which they likely abided by the rules and whether they practiced catch-and-release fishing.

Empirical analyses generally supported the theoretical propositions proposed in the model. Recreation specialization had a positive influence on activity-specific and

activity-general experience preferences as reasoned. Willingness-to-pay (WTP) were also positively affected by recreation specialization but negatively affected by activity-specific experience preferences and consumptive orientation. Likewise, recreation specialization was significantly related to the management support construct, while consumptive orientation was negatively significant. Finally, with regard to attitude and behavior relationships, only WTP was positively related to conservation behaviors. Recreation specialization and the other accrued concepts of general experience preferences (i.e., motivations) and attitudes when taken together appeared to provide substantial insights to understanding the existing pattern of conservation attitudes and behaviors.

Summary of Study 3: Racial and Ethnic Differences in Conservation Attitudes

With significant demographic changes on the horizon as well as increasing recreational use, a comprehensive understanding of racial and ethnic differences is important to help build more efficient management plans and provisions. Several studies focused on identifying racial and ethnic differences in preferred recreational activities, social and environmental settings, management practices and conservational attitudes (e.g., Stamps & Stamps, 1985; Taylor, 1989; Washburne 1978; Woodard, 1988). Nevertheless, there has been a lack of interest in understanding racial and ethnic differences in the formation process of building conservation attitudes in multivariate causal manners.

Using the conceptual framework proposed in Chapter III, the causal relationship model was tested in a similar manner using the structural equation modeling. Recreation specialization provides the core of building the causal framework in that heterogeneity of specialization level by racial and ethnic groups produces divergence in environmental attitudes, levels of support for conservation, and environmental knowledge and awareness (Ditton, 2004; Hunt & Ditton, 2002). The integration of recreation specialization to explain racial and ethnic differences is further advantageous to incorporate other explanatory elements such as experience preferences and consumptive orientation derived from recreation specialization into the overall theoretical causal framework, which explains the building process of conservation attitudes and concerns.

To account for racial and ethnic differences in conservation attitudes, this chapter had two main objectives: (1) to understand environmental attitudes toward degree of support for management regulations and the consumer surplus values to measure anglers' social benefits derived from the fishing experience; (2) to explore behavioral and attitudinal differences and their discrepancies in conservation attitudes by different racial and ethnic groups. The survey data were used with 1,189 and 219 Anglo and Hispanic respondents, respectively, who fished in saltwater. Two different samples of Anglo and Hispanic anglers were matched based on income, age, and residency location to control the effects of these variables (n = 210 in each group). The utilization of matched samples using socio-economic variables likely removed the marginality perspective. Thus, while different patterns discovered between these two groups likely stemmed from subcultural diversity, study results rather showed similar patterns of

fostering attitudes toward and preferences for resource conservation mainly explained by the framework of recreation specialization. Making use of confirmatory factor analysis and structural equation models, several theoretical perspectives (e.g., recreation specialization and experience preferences) provided a strong support for the proposed framework to explain the driving process of conservation attitudes of Anglo and Hispanics recreationists in terms of their conservation attitudes. All coefficients had expected signs except for the effect of recreation specailization to management support in Anglo anglers.

There was a strong support for the positive effects of recreation specialization on activity-specific and on activity-general experience preferences for both groups. It was also confirmed that the importance of activity-general experience preferences increases compared to activity-specific experience preferences, resting on continuum level of specialization in both groups. Whereas management support was negatively influenced by consumptive orientation, management support had a strong postive effect on WTP despite their relatively weak significance. However, it was noted that although a combined positive association between recreation specialization and WTP was confirmed in both groups, one interesting finding was derived from the negative impact of recreation specialization on management support in Anglo-Americans. A better understanding of behavioral and attitudinal differences based on diverse racial and ethnicity backgrounds should be helpful for maximizing the efficiency of planning, management, and service delivery. Results should help resource managers take racial and ethnic differences more into account in future management efforts to ensure

sustainable resource use.

Environment vs. Conservation

Environmentalism is generally defined and measured as multifaceted aspects of environmental attitudes and behaviors. An “environmental” attitude is defined as “a person’s general positive or negative feeling toward the natural surroundings of humankind, including air, water, land, wildlife, and the systems existing between the natural environment and human society” and an “environmental” behavior is “an action that can occur as a result of a person’s environmental attitudes” (Parker & McDonough, 1999; p.155). However, previous research in this area has provided inconsistent findings based on the assessment of aggregate outdoor recreation activities. This dissertation was conducted to explore the relationships in light of a single recreational activity of fishing primarily to maintain the same measurement level of specificity for both attitudes and behaviors (Ajzen & Fishbein, 1980; Scott & Willits, 1994). As a result, (resource) ‘conservation’ attitudes and behaviors used in this dissertation are more specific and useful for understanding the proposed relationships in an environmental setting of a single recreation activity. The terminology of conservation is useful to provide tailored management implications in a recreational fishing context. In this dissertation, ‘conservation’ is viewed as the protection, preservation, management, or restoration of specific natural resources and the settings such as forests, soil, and water (modified from the American Heritage Dictionary of the English Language, 2000).

Accordingly, it is not suitable to use the New Environmental Paradigm (NEP) scale (Dunlap & Van Liere, 1978) or New Ecological Paradigm (NECP) scale (Dunlap, Van Liere, Mertig, & Jones, 2000) in studies that focus on specific conservation attitudes. In contrast to these widely accepted assessment instruments (NEP or NECP) for general environmental attitudes, there has been no standardized measure for specific conservation attitudes. While general environmental attitudes have been used in a framework of aggregate recreational activities, generally, specific conservation attitudes are more appropriate in a single recreation activity.

To assess the fostering process of conservation attitudes, conservation attitudes were measured in two different ways: support for fisheries management policies and the economic nonmarket benefits (or WTP). Support for management policies intends to understand and predict anglers' opinions toward and preferences for fisheries resource conservation. WTP derived from nonmarket benefits valuation seeks to measure the level of support for resource conservation and protection. Although the CVM used in the studies does not allow separating into particular values contained within total WTP value, it is logical that a higher WTP value implies a higher portion of the value is allocated to resource conservation than a lower WTP value (Oh et al., 2005a). The scale developed and used in the studies, however, is probably not perfect and thorough and should serve as foundation for future efforts to improve a more convincing measure of conservation attitudes.

Contrary to support for management policies that measure specific conservation issues in a single recreation activity of fishing, WTP measures more general and broad

conservation issues. The question format of CVM used measured only a portion of use value, which consists of on-site, off-site, and option value (Ozuna & Stoll, 1991; Titenberg, 2000). Whereas on-site value is directly related to the consumptive and nonconsumptive use of environmental resources, off-site value includes use value accomplished away from direct resource use (Ozuna & Stoll, 1991). Furthermore, option value reflects anticipated values of how much current and future recreationists would be willing to pay for future on-site or off-site use of resources. Because the format of WTP used in the studies confined the boundary of benefit valuation only in the fishing context, the same measurement level of specificity and congruency between conservation attitudes and behaviors were still maintained.

Conceptual Framework of Recreation Specialization for Conservation Attitudes

Study results with the concepts built-in indicated that conservation attitudes were well-explained in the framework of recreation specialization regardless of different racial and ethnic origins. A number of studies have been dedicated to identifying that minority group members showed consistently lower participation in recreational fishing (e.g., Fedler et al., 1998; Pullis, 2000; Waddington, 1995) and to explaining the low level of outdoor recreation participation by minority ethnic groups (Manning, 1999; Gramann & Allison, 1999). From those studies, it has been known that Anglo anglers start fishing earlier in life and, consequently, have more years of experience than other minority anglers (Hunt & Ditton, 2001).

According to Hunt (2000), a leisure career model of participation is more appropriate to account for minority anglers' socialization process into fishing with schoolmates and workmates compared to a childhood deterministic model for Anglo anglers more socialized with families and friends. According to Hunt (2000), one of the viable reasons for minority underparticipation in fishing can be found on differences in leisure socialization processes. The theoretical perspectives such as marginality and ethnicity seem to well explicate the heterogeneous level of initial participation process by ethnic groups in outdoor recreation**.** However, after anglers manage these barriers (e.g., differences in leisure socialization process, various social and economic constraints), they likely participate in fishing activity on a continual basis, particularly after purchasing a license. Thus, as anglers are placed on a certain level of specialization and progress to higher stages of fishing participation (although some of those may not follow this pattern) (Scott & Shafer, 2001), relatively insignificant differences in conservation attitudes are not surprising due to the major effects of recreation specialization concept.

In a recreation specialization framework, the mechanism of fostering conservation attitudes is palpable: As level of specialization increases, the importance of activity-specific experience preferences increases while that of consumptive orientation diminishes (Ditton et al., 1992; Hvenegaard, 2001; Salz et al., 2001). Consequently, as high specialization anglers have a higher resource dependency than their counterparts, they are expected to show greater appreciation of and support for resource management practices that reduce adverse user impacts on natural resources. Consequently, they are

more likely to report a greater appreciation of and support for resource management practices and higher WTP than low specialization anglers (Oh et al., 2005a).

Comparable conservation attitudes toward particular natural resources are probably best explained by the concept of commitment, which is an important sub-dimension of recreation specialization. Commitment is defined as "the pledging or binding of an individual to behavioral acts which result in some degree of affective attachment to the behavior or to the role associated with the behavior and which produce side bets as a result of that behavior" (Buchanan, 1985; p. 402). As anglers invest more time and economic resources in fishing, they are behaviorally more bound to fishing and express a higher degree of affective attachment (Buchanan, 1985). As a result, fishing is expected to become a controlling central life interest as well as an important means of one's self-expression and self-concept (Buchanan, 1985; Sutton, 2001). An angler with a certain level of commitment along with other specialization dimensions that are mutually reinforced belongs to the ordered arrangement of the "social subworlds" (Ditton et al., 1992). Thus, anglers who are willing to progress along a continuum regardless of their racial and ethnic origins likely pursue the almost identical patterns of the fostering process of conservation attitudes in that activity.

Recommendations for Future Research

This dissertation includes a theoretical development and subsequent empirical investigation of causal connections of the fostering process toward conservation attitudes and behaviors using the recreation specialization framework. Hopefully, it will provide

the foundation for future studies that extend the findings reported here for an enhanced understanding in other recreational activities. Future studies in conservation attitudes and behaviors should focus on the following theoretical and methodological areas: (1) understanding recreation specialization as a market segmentation tool; (2), examining an appropriate number of segmented groups in terms of specialization; (3) exploring of specialization as a developmental process; (4) investigating the connections between specific and broad conservation issues; and, (5) refining methodological improvements. Each of these will be elaborated upon in the following paragraphs.

Recreation specialization appeared to be an effective market segmentation tool and as explanatory concept for understanding anglers' attitudes and behavior. With the unequivocal results shown in the dissertation, however, future studies need to take different directions. First, the research design used here failed to capture insight to which particular specialization variables influence conservation attitudes and behaviors more than others. As Kuentzel and McDonald (1992) pointed out, some aspects of specialization may have more impacts on outdoor recreation attitudes and behaviors than others. Accordingly, more research is needed to further address the extent to which particular components of specialization were more influential in modifying other motivational and attitudinal domains as well as conservation attitudes and behaviors as participants invested more time and financial resources in their fishing activity.

Second, based on previous study efforts (e.g., Hvenegaard, 2002; Scott et al., 2005), three segmented groups were used. Although Bryan originally used four groups in his trout angler study in Wyoming (1977), a subjective use of any number of

segmented groups resting on a researcher's conjecture can be criticized. Yet, although Bryan (1977) initially used four specialization groups, it is still moot. Thus, a case could be also made for three or five groups. Although there is no way to know the true number of specialization groups, a more systematic approach for determining the number of specialization groups will help improve understandings of anglers diversity. For example, the use of a statistical test, used in the latent class choice method can determine the extent to which recreation specialization components explain the membership probabilities that belong to a certain segmented group. Accordingly, this could be one means for determining the appropriate number of segmented groups without imposing a priori determined number of segmented groups (Gupta & Chintagunta, 1994; Swait, 1994).

Third, this study failed to consider the developmental aspects of recreation specialization because of the cross-sectional research design. As Scott and Shafer (2001) pointed out, recreation specialization is also understood as a developmental process. Thus, when recreationists become more specialized in a given activity over time with consistent participation (Ditton et al., 1992), longitudinal research designs, especially, a panel study is beneficial for understanding the effects of recreation specialization on sequential changes of recreationists' conservation attitudes and behaviors over time.

Fourth, future studies of environmental concern need to focus on investigating comprehensive relationships between specific conservation concern and broad ecosystem-level stewardship (e.g., environmentalism). Most previous studies have sought to confirm a positive association between involvement in outdoor recreation

activities and increased environmental concerns measured by either measurement of general environmental stewardship or of specific activity-oriented attitudes and behaviors. The focus of this dissertation was mainly the latter category. Accordingly, future studies need to incorporate a range of environmental attitudes and behaviors cutting across both the general environmental and specific resource arenas (Fedler, 2001). Further, a more comprehensive understanding of the dynamic nature of bridging these two areas will be beneficial.

Finally, two methodological concerns need attention to confirm and generalize study findings. First, the sampling design used in this study was constrained to include only Anglo and Hispanic angler groups for analyses. Accordingly, there was an inadequate sample size for other race and ethnic groups preventing further group comparisons. Because random sampling did not provide a sufficient number of samples for other groups of interest, other approaches (e.g., stratified sampling) need to be used to over-sample these other groups to extend the generalizations provided here. Second, single directional causal relationships were implied due to the ordering of variables in relationships so as to build the proposed theoretical causal model using specialization and other theories. However, these single causal relationships were only supported by the data used in the study and, thus were not conclusive (Bollen, 1989). A use of an inductive method such as the directed acyclical graph to sort out causal patterns internally rather than a priori model with an imposed prejudice of cause and effect assumption (Bessler, 2003; Haigh & Bessler, 2003; Pearl, 1999) deserves attention in the next phase of studies in environmental stewardship.

Management Implications

In general, based on the strong support for the proposed causal framework that explored anglers' attitudes towards and preferences for resource conservation, this dissertation has several management and policy implications. According to Nord, Luloff and Bridger (1998), there has been little research that examines the effects on environmentalism of outdoor recreation undertaken specifically in natural areas since the early 1980s. However, research with the subject is crucial for good policy and practice. They further specified that "if outdoor recreation leads to increased environmentalism, then funding, promoting, and operating parks and outdoor recreation facilities and programs may be effective components of a strategy for protecting and improving the natural environment" (p. 236). The management implications of this can be discussed in three main ways regarding conservation attitudes and behaviors: recreation specialization as an explanatory variable, recreation specialization as a segmentation tool and, racial and ethnic differences.

First, study findings provided a strong support for recreation specialization as a causal factor to explain an increasing concern for resource conservation. Previous specialization research has focused mostly on understanding the diversity of participants and the orientation of within activity sub-groups for various outdoor recreational activities. As a result, little research has sought to integrate theory-driven concepts of recreation specialization and other motivations (i.e., experience preferences) and attitudes in order to investigate causal relationships that mediate conservation attitudes and behaviors in a multivariate manner. To know the accurate multivariate nature of

developing conservation attitudes and behaviors is important in that it provide insights into explanatory factors supporting conservation attitudes and behaviors (Fedler, 2001). By knowing the accurate multivariate nature of developing conservation attitudes and behaviors, managers can gain an better understanding of anglers' support for fishery management and conservation issues. For example, with the continuous dependence of fisheries agency budgets on user generated revenue sources such as fishing license fees and equipment excise taxes, agency sponsorship of programs that recruit and retain anglers would be more palatable for many if there was a certain connection between fishing participation and conservation attitudes and behaviors (Holsman, 2000).

The evidence that recreation specialization is a good causal indicator contributing to conservation attitudes and behaviors suggests an important management implcation: management regimes by specialization level may increase angler support for fisheries management while at the same time providing quality fishing experiences (Chipman & Helfrich, 1988; Fisher, 1997; Salz et al., 2001). Consistent participation and emotional and financial investment in an activity should convert into a higher level of commitment with a greater concern for resource conservation, environmental settings, and their sustainability and subsequent conservation behaviors (Fedler, 2001; Oh et al., 2005b). Based on support of the proposition that level of conservation concern depends on level of recreation specialization (Bryan, 1977; Ditton et al., 1992), managers need an enhanced understanding of group differences (i.e., diversity) on numerous issues that enable them to improve service delivery.

Second, using the concept of specialization as a means of segmenting recreationists into managerially relevant groups by specialization level, study results provided support for the proposition that acceptance and support for the rules and procedures (as a sub-dimension of conservation attitudes) associated with fishing depends on anglers' specialization level (Bryan, 1977; Ditton et al., 1992). According to Chipman and Helfrich (1988), once angler subgroups and their attitudinal and behavioral heterogeneity are identified, managers can use this information in two general ways. First, they can provide diverse management strategies to meet angler subgroups' needs and wants. Second, segmentation based on specialization is beneficial for understanding how changes in management rules and regulations have a differential influence on multiple segments of the angling public and, thus, useful to avoid the unexpected displacement of affected angler types or attraction of others (Chipman & Helfrich, 1988). Managers can expect anglers in various specialization groups with different preferences to react differently to management options under consideration. Despite the need for implementation and enforcement of uniform management restrictions, Fisher (1997) pointed out "a diverse management regime may increase public support for fisheries management and conservation, bringing a concomitant increase in regulatory compliance" (p.8).

Study results also provided evidence that anglers' focus shifts from activity specific to activity general as level of specialization increases along a continuum. The level of support for management regulations incorporated in the study belongs to the realm of activity-specific experience preferences (i.e., those benefits unique to fishing).

Although there is little control over activity-general experience preferences (i.e., general benefits of recreational fishing), management agencies can have a certain level of control over activity-specific experience preferences (Fisher, 1997). Additionally, according to Gigliotti and Peyton (1993), in the decision-making process of management policy changes, low specialization anglers are less likely to become involved in policy decisions, compared to high specialization anglers with active political agendas. Accordingly, the opinions and preferences by low specialization anglers may not have a direct or powerful impact on the fisheries decision-making process. When the outcome of a fishing experience is likely affected by the changes of management scheme that does not reflect everyone's view, managers need to take angler diversity into account in management efforts in order not to disenfranchise certain angler segments.

Third, study results generally indicated strong support that recreation specialization and other latent concepts provided a good understanding of conservation attitudes for both Hispanic and Anglo anglers. A multivariate causal approach (i.e., structural equation modeling) was beneficial with the inclusion of mediating variables so that we could gain additional insights, 'how differently these incorporated variables have impacts on building conservation attitudes by different racial and ethnic groups'. Certain differences were identified in the models such as that Hispanics showed more concern for some causal connections into resource conservation and less concern for others. Nevertheless, these differences cannot be explained clearly. Both groups confirmed the similarly positive patterns of fostering conservation attitudes through their experience preferences and consumptive orientation in fishing context. Even using matched samples

to control the effects of socio-economic variables (i.e., the minimization of the marginality perspective), it is not credible that the findings lend full support to the subculture theory because Hispanic anglers are also concerned about the environment (Parker & McDonough, 1999).

According to Manning (1999), the assessment of interracial relations recommends that "managers should re-examine their agencies and programs for evidence of institutional discrimination (e.g., discriminatory pricing policies) and should be proactive in furthering programs to promote racial harmony" (p.39). Institutional discrimination indicates situations when the outcomes of agency decisions and process continually favor the majority clientele (i.e., Anglos in this case) and, thus, disadvantage minority groups (Hunt, 2000). Typically, fisheries management is funded largely by anglers', especially Anglo anglers' license fees and expenditures and not monies from general revenue funds (Bohnsack, 2002; Hunt, 2000). Agency programs funded by the majority of Anglo anglers for those who don't participate in fishing from the use of angler's monies may be reverse discrimination and displease the currently majority clientele. Nevertheless, in terms of dealing with fairness issues, "managers need the benefit of in-depth social investigations on potential impacts; there are many other inputs and outputs to consider in addition to dollars in an effort to maximize overall benefits" (Loomis & Ditton, 1993: p. 18). Additionally, inconsistencies between resource managers and minority group members in their orientations toward fisheries resources have been usually occurred without the appropriate recognition of racial and ethnic diversity (Hunt & Ditton, 2002). Hunt and Ditton further added that "such

inconsistencies in resource orientation and what constitutes appropriate behavior could result in activity conflicts, displacement, and in some cases, depreciative behavior" (p. 63). With significant ongoing demographic changes in the U.S., thus, a comprehensive understanding of racial and ethnic differences toward natural resources and their use is essential for successful fisheries management and conservation (e.g., Murdock et al., 1996; Toth & Brown, 1997).

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APPENDIX A

Table A1.

Properties of the Measurement Model for Recreation Specialization (Red Drum Anglers)

Variables	Standardized Loading	t[a]	Indicator Reliability
Behavior			0.88 [b]
TDAYFISH	0.80	17.91	0.64
TDAYSW	0.96	21.31	0.92
Skill & Knowledge			0.80 [b]
ABILITY	0.88	22.35	0.77
ABILESW	0.95	24.71	0.90
CSKILL	0.37	8.24	0.14
Commitment			0.46 [b c]
COMPARE	0.37	6.32	0.14
CLUB	0.43	7.29	0.19
EQUIP	0.58	9.09	0.35

Note: See the definitions of acronyms on P. 37.

[a] All t-tests were significant at $p < 0.001$.

[b] Denotes composite reliability.

[c] The low internal consistency was reported because of the use of non-scaled variables.

APPENDIX B

Table B1.

Properties of the Measurement Model for Recreation Specialization (Saltwater Anglers)

Variables	Standardized Loading	t[a]	Indicator Reliability
Behavior			0.95 [b]
TDAYFISH	0.99	34.85	0.98
TDAYSW	0.91	29.35	0.83
Skill & Knowledge			0.81 [b]
ABILITY	0.98	25.25	0.96
ABILESW	0.86	21.85	0.74
CSKILL	0.38	9.23	0.14
Commitment			0.72 [b]
FAMILY [c]	0.67	16.20	0.45
LEISURE [c d]	0.30	6.21	0.09
COMPANION [c]	0.72	17.38	0.52
FRIENDS [c]	0.77	18.65	0.59

Note: TDAYFISH - total and total number of days fished in the last 12 months, TDAYSW- total number of days fished in salt water in the last 12 months, ABILITY - anglers were asked to compare their general fishing ability to that of other anglers, ABILESW - anglers were asked to compare their saltwater fishing ability to that of other anglers, CSKILL - the level of skill constraint to fishing participation, FAMILY - my family or friends don't want to fish with me more often, LEISURE - other leisure activities take up my time, COMPANION - it is difficult to find others to fish with, FRIENDS - my friends don't fish much

[a] All t-tests were significant at $p < 0.001$.

[b] Denotes composite reliability.

[c] The item was reversely coded.

[d] Despite its relatively low standardized factor loading, the item was included based on the good support in using EFA.

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Table B2.

Scale Items Used to Measure Experience Preferences Constructs (Saltwater Anglers)

Construct	Scale Items	Scale Reliability (Cronbach's Alpha)
Escaping individual stressors	for relaxation	0.63
	to get away from the demands of the people	
	to get away from the regular routine	
Being in a natural environment	to be outdoors	0.73
	for family recreation	
	to experience new and different things	
	to be close the water	
	to be with friends	
	to experience unpolluted natural surroundings	
Interacting with fish	for the experience of the catch	0.80
	for the challenge or sport	
	for the fun of catching fish	
	to experience adventure and excitement	
Achievement	to obtain fish for eating	0.73
	to test my equipment	
	to win a trophy or prize	
	to develop my skills	
	to obtain a "trophy" fish	

Table B3.

Scale Items Used to Measure Consumptive Orientation Constructs (Saltwater Anglers)

Construct	Scale Items	Scale Reliability (Cronbach's Alpha)
Keeping fish	I usually eat the fish I catch	0.76
	I'm just happy if I don't keep the fish I catch [a]	
	I want to keep all the fish I catch	
	I'm just as happy if I release the fish I catch [a]	
Catching something	a fishing trip can be successful even if no fish are caught [a]	0.73
	when I go fishing, I'm just as happy if I don't catch fish [a]	
	if I thought I wouldn't catch any fish, I wouldn't go fishing	
	when I go fishing, I'm not satisfied unless I catch at least something	
Catching a trophy fish	I would rather catch 1 or 2 big fish than 10 smaller fish	0.68
	the bigger the fish I catch, the better the fishing trip	
	I'm happiest with the fishing trip I catch a challenging gamefish	
	I like to fish where I know I have a chance to catch a "trophy" fish	
Number of fish caught	the more fish I catch, the happier I am	0.71
	a successful fishing trip is one in which many fish are caught	

Note: [a] The item was reversely coded.

Table B4.

Scale Items Used to Measure Management Support Constructs (Saltwater Anglers)

Construct	Scale Items	Scale Reliability (Cronbach's Alpha)
Catch-related regulations	releasing fish below a certain length (minimum size limit) releasing fish above a certain length limit (maximum size limit) keeping fish within a certain length range, but releasing fish above and below this range (slot limit) being allowed to keep only a certain number of fish you catch in one day (daily bag limit)	0.80
General fishing regulations	stocking fish in saltwater a catch and release area for a specific saltwater fish a tag to retain a "trophy" fish not being allowed to fish in certain restricted area having certain fishing areas closed during part of the year (closed season) prohibiting the use of certain types of sport fishing gear prohibiting the use of certain types of bait	0.79

Table B5.

Estimated Logit Regression Model to Measure WTP (Saltwater Anglers)

Variable	Estimate	Std. Err
Intercept	-0.8790	0.552
BID	-0.0156**	0.002
INCOME	0.1579**	0.033
GENDER	-0.1419	0.254
SATISSW	0.4076**	0.104
YEARSSW	-0.0022	0.007

Note: Dependent variable - Yes (=1) or No (=0), response of respondent to the contingent valuation question, Bid - bid values ranging from $5 to $165, INCOME – approximate annual household income before taxes, gender – male (=1), female (=0), SATISSW - the level of fishing satisfaction in salt water, YEARSSW – the number of fishing years in salt water

** indicates the statistical significance at 0.05 level.

The mean CS value can be computed as $\text{Mean CS} = 1/\hat{\beta}_{\text{bid}} \times \ln(1+\exp(\hat{\beta}_{\text{mean}}))$,

where $\hat{\beta}_{\text{bid}}$ is the bid value and $\hat{\beta}_{\text{mean}}$ is the combined constant as multiplying the coefficient to its mean except bid (Hanemann, 1989).

Table B6.

Scale Items Used to Measure Conservation Behaviors Constructs (Saltwater Anglers)

Construct	Scale Items	Scale Reliability (Cronbach's Alpha)
Catch-and-release practice	do they release all legal sized fish they catch	0.68
	do they voluntarily practice catch and release	
Voluntary support	do they "fudge a bit" when measuring the fish they catch	0.54
	do they catch they daily bag limit of a particular saltwater species and go fishing again the same day to catch another bag limit	
	do they ever exceed their daily bag Limits	
Abiding by the rules	do they support and abide by TPW fishing rules and regulations for saltwater fishing	0.48
	do they report violations of fishing regulations	
	do they try to prevent damage to seagrass from their boat motor	
	do they abide by TPW licensing requirements when fishing saltwater	

APPENDIX C

Table C1.

Properties of the Measurement Model for Recreation Specialization (Anglos & Hispanics)

	ANGLO ANGLERS			HISPANIC ANGLERS		
Variables	Standardized Loading	t[a]	Indicator Reliability	Standardized Loading	t[a]	Indicator Reliability
Behavior			0.88 [b]			0.93 [b]
TDAYFISH	0.89	9.34	0.79	0.97	13.34	0.94
TDAYSW	0.89	9.33	0.79	0.89	12.18	0.79
Skill & Knowledge			0.59 [b]			0.63 [b]
ABILITY	0.44	5.12	0.19	0.57	5.67	0.32
ABILESW	0.34	4.05	0.12	0.43	4.48	0.18
CSKILL	0.89	7.76	0.79	0.78	6.47	0.61
Commitment			0.70 [b]			0.69 [b]
FAMILY [c]	0.60	8.34	0.36	0.64	8.54	0.41
LESIURE [c d]	0.29	3.60	0.08	0.31	3.77	0.10
COMPANION [c]	0.77	11.06	0.59	0.69	9.33	0.48
FRIENDS [c]	0.74	10.59	0.55	0.72	9.66	0.52

Note: TDAYFISH - total and total number of days fished in the last 12 months, TDAYSW- total number of days fished in salt water in the last 12 months, ABILITY - anglers were asked to compare their general fishing ability to that of other anglers, ABILESW - anglers were asked to compare their saltwater fishing ability to that of other anglers, CSKILL - the level of skill constraint to fishing participation, FAMILY - my family or friends don't want to fish with me more often, LEISURE - other leisure activities take up my time, COMPANION - it is difficult to find others to fish with, FRIENDS - my friends don't fish much

[a] All t-tests were significant at $p < 0.001$.

[b] Denotes composite reliability.

[c] The item was reversely coded.

[d] Despite its relatively low standardized factor loading, the item was included based on the good support in using EFA.

Table C2.

Scale Items Used to Measure Experience Preferences Constructs (Anglos & Hispanics)

		ANGLO ANGLERS	HISPANIC ANGLERS
Construct	Scale Items	Scale Reliability (Cronbach's Alpha)	Scale Reliability (Cronbach's Alpha)
Escaping individual stressors	for relaxation	0.63	0.62
	to get away from the demands of the people		
	to get away from the regular routine		
Being in a natural environment	to be outdoors	0.64	0.65
	for family recreation		
	to experience new and different things		
Interacting with fish	for the experience of the catch	0.76	0.83
	for the challenge or sport		
	for the fun of catching fish		
Achievement	to experience adventure and excitement		
	to test my equipment	0.73	0.80
	to win a trophy or prize		
	to develop my skills		
	to obtain a "trophy" fish		

Table C3.

Scale Items Used to Measure Consumptive Orientation Constructs (Anglos & Hispanics)

		ANGLO ANGLERS	HISPANIC ANGLERS
Construct	Scale Items	Scale Reliability (Cronbach's Alpha)	Scale Reliability (Cronbach's Alpha)
Keeping fish	I'm just happy if I don't keep the fish I catch [a]	0.74	0.61
	I want to keep all the fish I catch		
Catching something	I'm just as happy if I release the fish I catch [a]	0.69	0.72
	a fishing trip can be successful even if no fish are caught [a]		
	when I go fishing, I'm just as happy if I don't catch fish [a]		
	if I thought I wouldn't catch any fish, I wouldn't go fishing		
	when I go fishing, I'm not satisfied unless I catch at least something		
Catching a trophy fish	I would rather catch 1 or 2 big fish than 10 smaller fish	0.70	0.66
	the bigger the fish I catch, the better the fishing trip		
	I'm happiest with the fishing trip I catch a challenging gamefish		
	I like to fish where I know I have a chance to catch a "trophy" fish		
Number of fish caught	the more fish I catch, the happier I am	0.63	0.63
	a successful fishing trip is one in which many fish are caught		

Note: [a] The item was reversely coded.

Table C4.

Scale Items Used to Measure Management Support Constructs (Anglos & Hispanics)

		ANGLO ANGLERS	HISPANIC ANGLERS
Construct	Scale Items	Scale Reliability (Cronbach's Alpha)	Scale Reliability (Cronbach's Alpha)
Catch-related regulations	releasing fish below a certain length (minimum size limit) releasing fish above a certain length limit (maximum size limit) keeping fish within a certain length range, but releasing fish above and below this range (slot limit) being allowed to keep only a certain number of fish you catch in one day (daily bag limit) a catch and release area for a specific saltwater fish a tag to retain a "trophy" fish	0.83	0.83
General fishing regulations	not being allowed to fish in certain restricted area having certain fishing areas closed during part of the year (closed season) prohibiting the use of certain types of sport fishing gear prohibiting the use of certain types of bait	0.82	0.76

Table C5.

Estimated Logit Regression Models to Measure WTP (Anglos & Hispanics)

	Anglo Anglers		Hispanic Anglers	
Variable	Estimate	Std. Err	Estimate	Std. Err
Intercept	-0.9010**	0.345	-2.3919**	0.881
BID	-0.0175**	0.001	-0.0135**	0.003
HIINCOME	0.5108**	0.139	-0.0332	0.430
TOTCOST	0.0023**	0.000	0.0055**	0.002
TRIPDAY	0.4076**	0.052	0.4527**	0.210
SATISSW	0.3060**	0.078	0.4019**	0.178
COMPARE	0.0295	0.057	0.1335	0.153

Note: Dependent variable - Yes (=1) or No (=0), response of respondent to the contingent valuation question, Bid - bid values ranging from $5 to $165, HIINCOME – above $70,000 (=1), otherwise (=0), TOTCOST – per trip expenditures, SATISSW - the level of fishing satisfaction in salt water, COMPARE – level of importance of fishing compared to other outdoor recreation activities

** indicates the statistical significance at 0.05 level.

The mean CS value can be computed as $\text{Mean CS} = 1/\hat{\beta}_{\text{bid}} \times \ln(1+\exp(\hat{\beta}_{\text{mean}}))$,

where $\hat{\beta}_{\text{bid}}$ is the bid value and $\hat{\beta}_{\text{mean}}$ is the combined constant as multiplying the coefficient to its mean except bid (Hanemann, 1989).

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Kim, C., Scott, D., & Oh, C. (2005). Effects of acculturation, leisure benefits, and leisure constraints on acculturative stress and self-esteem among Korean immigrants. *Society and Leisure.*

Oh, C., & Ditton, R. B. (2005). An evaluation of price measures in tourism demand models. *Tourism Analysis*.

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